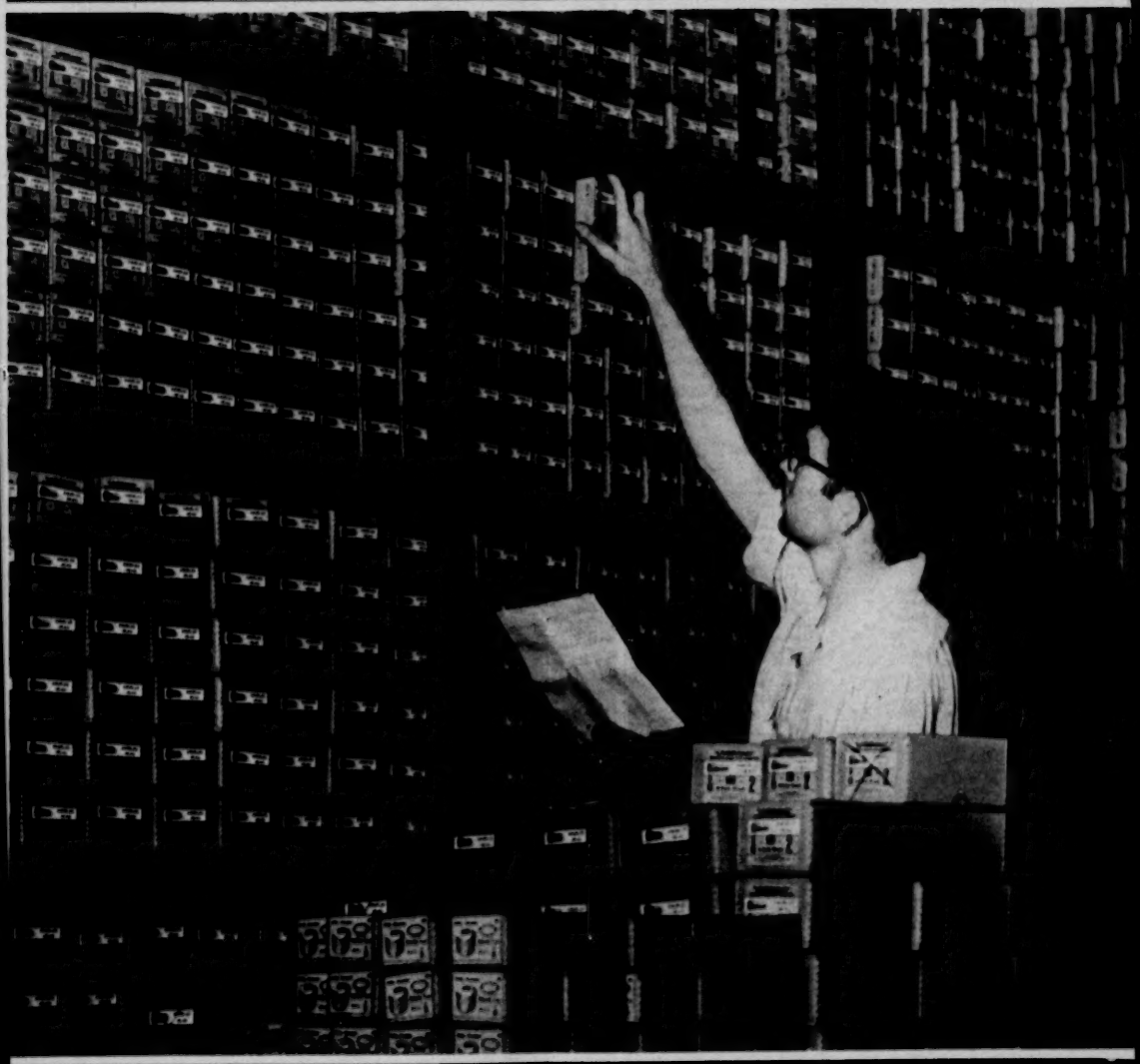
News Magazine of the American Standards Association, Incorporated



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Marginal Notes

The CMC at Norfolk—

The visit of members of the Company Member Conference to the Norfolk Naval Base and the aircraft carrier, *USS Midway*, was one more step in cementing cooperative relations between Government agencies and industry. Among the companies represented were some of the most important Government contractors in the country. Not only did they see for themselves why the Defense Department considers it has special problems of standardization, but the Navy men who met with them had an opportunity to hear at first-hand the ideas and opinions of these representatives of companies engaged in meeting the supply requirements of the Navy. Many questions were asked in a sincere desire to learn. They were frankly answered.

That such close relationship is of increasing importance to the welfare of both Government and industry was emphasized by Rear Admiral Joseph W. Fowler who is in charge of standards activities of the Munitions Board (see page 203). In his opinion, arrangements should be made whereby groups such as the Company Member Conference, affiliated with the American Standards Association, could have an opportunity to comment on draft standards being proposed as coordinated military standards, Admiral Fowler said. This opportunity should be given at the same time that drafts are sent to military departments, he said. Further, he would like to see ASA represented on task groups preparing military standards, and conversely, believes the Department of Defense should have liaison representation on task groups working on standards under the procedure of the American Standards Association. Admiral Fowler and the Defense Department can be assured that ASA will heartily welcome any such developments, and will give its cooperation in every way possible.

Rear Admiral J. E. Wood, commanding officer of the Naval Supply Center, welcomed members of the CMC and introduced members of his staff who explained the various activities of the Center and accompanied the group on its tour.

Military Photographic Lenses—

On page 211 of this issue is a specific example of how the use of American Standards has been of assistance to the Military. Physicist C. W. Kendall has been associated with the U.S. Air Force since 1929. He has been engaged in research and development on photographic lenses for use in aerial photography as well as for ground equipment, and has made material contributions to the field of photographic optics.

Our Front Cover

The Standard Pressed Steel Company finds that orders for standard items are filled directly—and quickly—from stock shelves. Specials take much longer, cost much more. On page 207, H. Thomas Hallowell, Jr, SPS president, tells how and why he thinks "Specials Can Be Licked."

Opinions expressed by authors in STANDARDIZATION *are not necessarily those of the American Standards Association.*

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Standardization is dynamic, not static. It means not to stand still, but to move forward together.

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ASA

Reg. U. S. Pat. Off

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Re-entered as second class matter Jan. 11, 1949, at the P.O., New York, N. Y., under the Act of March 3, 1879.

Above: Captain Frank O'Beirne, USN, Commanding Officer of *USS Midway*, (right) welcoming aboard ASA's Managing Director, Vice Admiral G. F. Hussey, Jr, USN (ret).

Above, right: Officers of CMC with Admiral Hussey and Admiral Spangler. (Left to right) Kenneth B. Clarke, Western Electric Company, CMC vice-chairman; Rear Admiral S. B. Spangler, USN; S. H. Watson, RCA Victor Division, Radio Corporation of America, CMC chairman; Admiral Hussey.

All photographs used in connection with this article are Official U. S. Navy Photographs.

Above: On this flight deck control board, a mock-up to scale is used to duplicate at all times the actual position of each of the 100 planes carried by the *USS Midway*.

Left: CMC members looking over the ship from the bridge.

Rear Admiral R. O. Davis, USN, Commandant, 5th Naval District, welcomed CMC members to the Navy's Norfolk Naval Base. Left to right: Vice Admiral G. F. Hussey, Jr, USN (Ret), ASA Managing Director; Rear Admiral D. H. Clark, USN, Commander, Norfolk Naval Shipyard; Admiral Davis.

Norfolk 1952

Company Member Conference Views Navy's Supply Operations

SOME 60 members of the Company Member Conference were "welcomed aboard" when they visited the Norfolk Naval Base and the aircraft carrier *USS Midway* at their spring meeting May 21 and 22. With S. H. Watson, RCA Victor Division, chairman of CMC presiding, the group received a welcome from Rear Admiral R. O. Davis, USN, Commandant of the 5th Naval District, and by Rear Admiral D. H. Clark, USN, Commander of the Norfolk Naval Shipyard.

In 15 small groups they were escorted over the aircraft carrier to see not only how aircraft are landed and returned to the mother ship, but also how supplies and repair parts are stored and handled, how repairs are made, and how the ship itself is operated.

The activities of the Norfolk Naval Shipyard were explained in detail in a film before the group started a tour of the installations themselves. The film told a graphic story of how standardization helps maintain the country's fighting ships (both naval and air) in effective condition at the greatest return per dollar appropriated.

A visit to the Naval Supply Center, including one of the largest buildings in the U.S. outside the Pentagon itself, showed some of the operations pictured in the film as they actually exist. In only one example, the visitors were told, reducing Class 2 and 3 fits of nuts and bolts to one stock number eliminated 3,000 storage bins.

A never-to-be-forgotten experience was the visit to the aircraft overhaul and repair center at the Naval Air Station, Here, planes that have run their assigned number of missions are taken down, inspected, tested, and completely remodeled, providing the equivalent of new planes for a small fraction of the cost.

An unscheduled incident that made a strong impression on all who saw it was a view of the *Wasp*, her damaged hull repaired, reloading her planes and making final preparations to return to sea. Despite a close view and careful scrutiny, the great hole in the ship's side, made when she collided with the *Hobson*, had been repaired so perfectly that no trace of the wound could be seen.

In addition to the inspection tours, a program of speeches brought the story of standardization before the visitors. T. D. Jolly, vice-president, Aluminum Company of America, and past-president of ASA, in his paper, commented on the Government's standardization program as mentioned by Willis S. MacLeod, director of the Standards Division, Federal Supply Service before ASA's Standards Council early this spring (STDZN, June, page 166).

Because of bad weather, which prevented him from flying to Norfolk from Pittsburgh, Mr Jolly was unable to present his paper in person. It was read by Vice Admiral G. F. Hussey, Jr, USN (Ret), managing director of ASA. As a Navy man himself, Admiral Hussey also introduced the Navy officers on the program.

Mr Jolly declared that the government's newly announced policy of using the standards of private industry in its buying, instead of writing its own federal specifications, can save American industry and the American people millions of dollars and countless hours of wasted motion. He called it possibly the most important forward step the government has ever taken in standards work.

Mr Jolly commented on the fact that frequently the government does not make use of standards already in existence, either through ignorance of the fact that they exist or because

some individuals in the government still think the term "trade association" is a bad word. Mr Jolly cited some cases in which industry has caused Government procurement people "plenty of headaches by not having what common sense and all past experience demand—a set of national standards." He called attention to some of the points brought out by Mr MacLeod showing what the Government is doing to make it easier to find material and prevent duplications. "If the Federal Government had had an adequate supply catalog in those postwar years when it was disposing of war surplus goods, it would have saved the country many millions of dollars," he pointed out. "Instead of selling carloads of boxes 'contents unknown' it could have given American industry an exact description of most of what it had, and thus supplied it with many things it needed and was anxious to get."

"Information from the present cataloging program is just now being published in such form that it can be made available to industrial suppliers," he declared.

"You are all aware, of course," he continued, "that the Federal Catalog System has been in the news lately—indeed, in the headlines. The Anderson Bill, passed by the House early this month, would create a new Defense Supply Management Agency and direct the three armed services to use a single catalog for the items it buys."

"There may be a tendency on the part of the public to over-simplify the problem in terms of their own experience," he commented. "There seems to be universal agreement among laymen, for instance, that one purchasing agency of the Government should buy all of a given item of supply and distribute it to all the other branches that need it. Why? The theory is that the price will be lower because of bulk buying. The fact is, however, that it will not.

"On most items, the requirements of any Federal Department are sufficiently large to obtain the most advantageous price. At a certain point in bulk buying, the price stops going down and it may even go up. What paint manufacturer, for example, or any other private manufacturer, wants to produce exclusively for the Government, and risk losing his civilian customers? And what about the agency that needs supplies in a hurry? What about flexibility in purchasing? What about the inevitable delays of an over-centralized purchasing system?

"Standardization, not centralization, is the proper solution to efficient, economical Federal procurement. An adequate Federal supply catalog and intelligent agreement among the Federal agencies, such as I have been talking about today, can make that standardization possible."

Papers presented by Rear Admiral Selden Booth Spangler, USN, Force Maintenance and Material Officer, Air Force, U.S. Atlantic Fleet; by Rear Admiral J. W. Fowler, USN, Director of Supply Management Agencies, Munitions Board; and by Commander R. H. Northwood, SC, USN, Officer in Charge of General Stores, Naval Supply Center, Norfolk, are published on the following pages.

From the roof of the Naval Supply Center, CMC members got a general view of the base. Aircraft carrier in foreground (at Pier 4) is the *USS Wasp*. Other ships shown include repair and supply ships.

Official U. S. Navy Photograph

One of the new Paisecki helicopters was seen in the display of naval aircraft

Some Thoughts About Standards

by Rear Admiral Selden B. Spangler, USN

Force Maintenance and Material Officer, Staff, Commander Air Force, Atlantic Fleet

Admiral Spangler can comment on the problems of equipment development from experience. In the '20s he made history with the Pacific Fleet as Chief Flight Officer of the Fleet's Observation Wing when he made the third take-off and thirteenth landing on the aircraft carrier *USS Saratoga*. He served as a member of the Jet Propulsion Committee of the Allied Nations from 1939 to 1943, and as Director of the Power Plant Division of the Bureau of Aeronautics until 1946. After serving as Overhaul and Repair Officer at the Naval Air Station, Alameda, California, and Director of the Bureau of Aeronautics' Maintenance Division, he was assigned as Commander of the Naval Air Development Center. His present duty as Maintenance and Material Officer on the staff of Commander Air Force, U. S. Atlantic Fleet followed. In this capacity he has responsibility for the maintenance and material condition of Atlantic Fleet aircraft and Air Force, U. S. Atlantic Fleet surface vessels.

THE standards problem is a very real one for the Navy, but at the same time, one that can stand a great deal of interpretation. In looking over the papers issued by the American Standards Association, or under its aegis, I find the subject matter to vary from mathematical theory to what might almost be considered production shop drawings. Having been an operating naval aviator, an engineer interested in both research, development and design, a producer, and a maintenance man, I find my interests to have varied from time to time over the same gamut. However, I also find that my ideas on the subject of standards have pretty well crystallized into an operational theory that borrows from all experiences. I shall try to distinguish in this discussion between various degrees of standardization and give you my ideas on them. As is to be expected in the discussion of a subject which can arouse so much controversy, I must warn you that my ideas do not necessarily represent the official views of the Navy Department, and I sometimes wonder if they have adequate jewel-like qualities to be considered completely consistent within themselves.

First and most obvious, of course, are those standards by which we all set our sights: the chronometers in the naval observatory, the bar of metal in the sub-vault of the Bureau of Standards, the classical equations of equivalence. Here we have no problem. These are the things which to our world are relatively unchangeable. They are established once and for all and are thereafter possibly improved but seldom changed in concept. As new fields are discovered new standards are developed and promulgated, of course, thus adding to the total number.

In research one prefers not to be bound by any standards other than those natural laws not subject to repeal. In fact, it is usually felt, or at least hoped, that new standards will be evolved.

In development, again one prefers not to be bound by arbitrary standards but only by the essential ones. Development normally presupposes an attempt to determine the possibilities and probabilities of new methods of doing things or of new types of equipment. Here one usually establishes what the governing laws are and then makes every attempt to outwit them. In development, however, we introduce a new set of standards which may be called performance standards or requirements. These are probably the most important of all standards.

Most naval standards are in this general field. Some years ago I aided in the development of the first series of Joint Army-Navy Specifications, those on aircraft power plants. They

Official U. S. Navy Photograph

Sample boards showed how variations in different manufacturers' products cause duplication in contacts, connectors, insulators, and gaskets used in electronic equipment. Navy gives stock numbers to spare parts, saves money.

were the forerunners of the A-N 9500 Series. In these specifications every attempt was made to set standards for development which defined what the power plant or accessory was to do, under what conditions it was to operate, how long it was to last, how it was to be operated and maintained, and by whom, etc. The intrinsic qualities of the engine were specified in maximum terms. Such things as maximum weight per horsepower; maximum specific fuel consumptions, maximum permissible heat rejection to the oil, maximum diameter and length, horsepower available for accessory drives, maximum air flow requirements and drag, were all carefully set forth. I believed in telling the developer exactly what I wanted the engine to do, leaving to him the matter of determining how to build the engine to meet these standards.

In establishing this type of standard of performance one usually starts with the best performance then available and adds as much as one dares in order to provide a goal beyond that already achieved. Since this country has always believed in individual effort and private competition, this method has made progress in aviation in the United States in the last 45 years the most amazing in any field of effort in any nation. Contrary to all normal expectation, the shape of the airplane performance curve plotted against time corresponds more nearly to $Y = X^x$ than $X = Y^x$.

Naturally, in preparing this type of standard the question of when a specification ceases to be a performance standard and becomes a manufacturing standard is certain to rise and has led to many and bitter arguments. For example, before the Navy developed the so-called "quickly removable power plant" which permitted the removal of the engine plus accessories plus mount at the fire wall rather than the engine from the mount, the mounting circle was closely specified as to attachment points, numbers of bolts, bolt circle diameter, and similar details. This, then, amounted to standardization in the most usually accepted sense and was bitterly fought by the manufacturers as unduly restrictive in design. However, after several cases of demonstrating how one manufacturer's engine could be removed and replaced by another the opposition seemed to disappear. Perhaps this was a poor choice of an example as applied to development since it is more nearly a design criterion. However, for some years, it did very radically influence engine development in terms of size, weight, and maximum power. With the development of the quickly removable power plant, however, where the attachment points were moved aft to the firewall these inhibitions disappeared.

Development standards frequently result in entirely unlooked for results, but then, it is my belief that many, if not most, discoveries are by-products of investigations conducted to obtain quite different answers. As an example, it early became obvious that the aircooled engine, to survive, would necessarily have to prove its ability to operate under a wide variety of combinations of power, altitude, and weather conditions. The question, then, was how to set a standard of airplane performance which would ensure a satisfactory naval airplane under all but the most severe of operating conditions. One could not select the worst conditions since that would arbitrarily handicap the airplane under the best conditions. So, over a period of about three years, an intensive series of tests were run and measurements of operating conditions obtained. Out of this one investigation came several most interesting results. It was discovered that the standard NACA lapse rate of temperature and pressure with altitude was conceivably true for a given latitude and longitude on a given day, but far from even an average of what might be expected at markedly different latitudes on other days. The curves of temperature with altitude at the poles and at the equator were not even the same shape, and, amazingly enough, average temperatures at altitude at the poles were considerably higher than at the equator. This led to a whole new set of standards and an over-all advancement of the knowledge of atmospheric conditions at altitude. Other results led to the conclusion that the only salvation for the air-cooled engine was a variable cooling-air flow which led to flapped cowls, venturii cooling, etc.

Many other examples might be cited of development standards established over a long period of years which have led to major advances in the aeronautical sciences. However, the major point to be realized here is that these standards were always specified in terms of a performance to be achieved under varying but specified conditions. They were no less standards for being in more general terms

and for always being slightly better than it was hoped could be attained. From the standpoint of development it is highly undesirable to do otherwise. Any other method can only lead to stultification of thinking and progress up and down instead of forward.

When we leave development behind and get into design and production design, we enter an entirely new field of standards. This is the field which the average man thinks of as standardization. The Underwriters' code means little to him; he thinks in terms of standardization as meaning the ability to go to Sears and buy bolts for 25 cents per dozen which will fit his automobile, mowing machine, or refrigerator with equal facility. He is not particularly consistent in this, either. He would like to be able to take the generator off his 1946 Ford and put it on his 1952 Ford with no trouble and equal performance. But as Henry Ford found out years ago, people will not buy Model T's forever, good as they may be.

It is in this field that the major arguments as to a new piece of production equipment always develop. Shall the production designer use that special bolt used by the development engineer or will an existing design do just as well? Here the true standards—the performance standards—usually control. I say "usually" only because there are many ways of skinning a cat; sometimes slight design changes will permit the use of standard parts and still meet the performance requirements. However, the development engineer, the planner, and the production man are natural enemies and this is the field of argument that makes them so. The eternal question is whether to have "more" or "better." The usual answer involves not only how much is more and how good is better, but what is the competition. In other words, will it sell and at the price.

Here the commercial and military designers diverge rapidly. The commercial designer need only determine if his product will sell at the price, and both sales appeal and price are primary considerations. If the customer wants "streamlining" or a sky-blue pink color, that's what he gets. While durability, reliability, and ease of maintenance are factors, they are seldom over-riding considerations. There is little compulsion on the designer to reduce safety factors to as near zero as possible, except labor and material costs, so, as a general rule, his equipment can be made simple and rugged. Compare the weight of a truck Diesel at 10 pounds per horsepower or more with the aircraft gas turbine at 0.3 pounds per equivalent horsepower. Naturally, the commercial designer uses as many available standard parts and as much of his existing tooling as practicable in order to cut his costs. He need only give his product external sex-appeal and possibly improved performance, or at least an item to talk about which appears to imply improved performance, such as streamlined rear bumpers and lights.

Official U. S. Navy Photograph

Touring the repair and overhaul section where planes damaged or worn out in service are torn down, overhauled, repaired, and rebuilt. Rebuilt planes are stringently tested before being returned to service.

The military designer, on the other hand, must compete directly with the enemy in quite brutal terms. Will it shoot down or be shot down? Can it do its job with a better than even chance of success? I will admit it often appears that the military consumer is misled by appearances and shibboleths, as witness the current craze for jet propulsion, usable and applicable or not. The military designer must, therefore, consider performance first and ability to be manufactured and maintained second. It is entirely possible that air performance can and must, on occasion, be subordinated to some degree to other considerations; for example, a rocket airplane has many air performance attractions but it is not a practical naval aircraft because of the difficulties in supplying it with fuel, maintaining it, and getting it into the air and back again.

The concern of the military designer, in general then, is to obtain the absolute maximum of performance out of his airplane and all its parts. Hence, he is inclined to be very reluctant to use a standard part which is not the acme of perfection; his margin for error is already too small. As a consequence it is highly probable that he will set his own standards for everything from rivets to landing gear and his only deterrent will be excessive cost or the inability to get what he wants. The standardization possibilities, then, appear to him to be restricted to those items of need and use in all aircraft and which have been determined as the best that can be built. In this attitude he is almost certain to get the complete sympathy of the military user since the military man wants maximum performance and because he does not want to give the manufacturer any excuse for saying his failure to meet requirements was due to being forced to use A-N-A standard parts.

This appears to paint a blacker picture of standardization in aeronautics than is perhaps warranted by the facts. There are, in fact, many airplane parts which are the best that can be built and will fit all aircraft. Some of these are standard A-N-A parts; many are not, since every year or so someone develops and produces a better one, which then automatically becomes the standard. In addition, there are hundreds of items of equipment both contractor-furnished and government-furnished which are universal enough to become standards, at least for a series of aircraft. In general, these are standards only because the using services are satisfied with their performance for the moment, or are willing to sacrifice some performance to obtain a degree of interchangeability, or are forced to this step in order to obtain the desired equipment in adequate numbers. Here we may introduce a new idea of a standard; i.e., one that is standard to a given series of aircraft rather than to all aircraft. For example, if the Navy buys a thousand F9F-5's it is entirely reasonable to assume that all parts of all aircraft of this model will be interchangeable and therefore standard with that model. Barring changes required for safety of flight, this is customarily achieved. Using the automobile as an analagous piece of equipment, it is obviously desirable, for the sake of both manufacturer and customer, that all 1952 Fords be identical except for color and body style. It is not necessary, however, that parts of 1952 Fords be standard or interchangeable with similar parts of 1952 Chevrolets, although some parts are. In other words, the use of a part in an F9F-5 or in a 1952 Ford automatically establishes a standard part with a volume of production which makes such standardization practicable and practical. Enough such parts are made and sold to justify an F9F-5 or 1952 Ford supply and maintenance system in itself. It certainly helps if the F9F-5 uses the same radar as the F3D-1 and such an event greatly simplifies maintenance, overhaul, and supply support. But, if either aircraft is unduly compromised by the required use of identical equipment, performance must be the deciding factor.

Official U. S. Navy Photograph

In the Nuts and Bolts Section of the Supply Center. By assigning the same stock number to Class 2 and 3 fits it was still possible to meet 85 percent of requirements from stock. This standardization eliminated 3,500 stock bins.

Perhaps this might be taken to indicate a lack of cost consciousness on my part or a failure to understand production, maintenance, and support problems. I do not consider it so. The military operator must define economy primarily in terms of losses of aircraft and crews in combat. It is of no value to a carrier task force operating at sea to carry aircraft whose production rate is unlimited, but which needs one hundred percent replacement on every sortie. The production and supply problems then become completely unsolvable although admittedly maintenance problems are non-existent.

What, then, can be done in the standardization of aircraft and aircraft parts? One obvious answer is to select a given model airplane for a given job, being certain to select the best one available, and produce this model until a better one has been developed, and one enough better to warrant a shift. This, then, establishes adequately a standard airplane, at least for this particular use. Similarly, wherever practicable and justifiable, establish standard equipment to meet standard requirements, maintaining them in production as long, but only as long, as they are the best that can be built. These then become standard by right of pre-eminence; not by directive.

It is in the field of interchangeability that industry can contribute the most to aviation to improve maintenance and supply problems. We are all aware, using the automobile industry again as analagous, that one may enter a Lincoln agency and put 15 dollars on the counter for, say, a clock identical with the one that the Ford owner will pay 10 dollars for at the Ford agency. Similarly, each airplane contractor will identify each part of his airplane with his own part number, and replacements and spares must be ordered from him by that part number. If another contractor uses the identical part in his airplane under his own part number, the Navy winds up with an identical and completely interchangeable part carried under 2 to 10 part numbers and with a stock 1½ to 5 times that necessary. In some cases this has been carried to the extreme of assigning different part numbers to identical equipment on succeeding models of the same airplane produced by the same manufacturer. To cure this situation, one need only insist that identical parts be identically identified. This one step would do more to simplify standardization problems than any other that might be taken at this time. I personally would be willing to subsidize the contractor to the extent of the profits he may have lost by the loss of this retail business to obtain a simpler, better, and more economical stock system.

Interchangeability, of course, involves a great deal more than simple identification of parts. As previously discussed, it is most desirable to take early advantage of research and de-

(Continued on page 220)

Two retired admirals with a common interest in standardization—Rear Admiral J. W. Fowler (left); Vice Admiral G. F. Hussey, Jr. (right)

Coordination . . Key to Munitions Board Work on Standards

by Rear Admiral J. W. Fowler, USN (Ret)

Director, Supply Management Agencies, Munitions Board

AS Director of Supply Management Agencies in the Munitions Board, I have responsibility for administering the programs of both the Munitions Board Standards Agency and the Munitions Board Cataloging Agency.

These two activities are housed in the same building, share files and facilities, and have as a common aim simplification and promotion of economy in Federal supply operations. They share a tremendous task.

A few statistics drawn from cataloging estimates will indicate the scope of the task facing the Standards Agency. It is estimated that the Federal Government will have 3,750,000 items of supply on its books by the end of this fiscal year. Of this number, 3,250,000 occur in the military departments; 500,000 have been reported by the civil agencies to be exclusive with them. One million of the total are considered by the General Services Administration to be common to both military and civil agencies. It is estimated that 250,000 new military items will enter the supply systems during Fiscal Year 1953.

The Standards Agency is charged with reducing these items to the least practicable number of variables required to carry on supply operations. The figures I have cited indicate the breadth and depth of such an undertaking.

But, the Standards Agency responsibility goes far beyond this simplification process. I shall quote the five specific jobs assigned in the Agency charter to give you a thorough understanding of the extent of our operation:

"1. To reduce to a minimum the number and types of items in the military supply systems, and to increase the interchangeability of parts used in the items and subsequent development of standards and specifications to reflect this standardization.

"2. To develop plans, policies, procedures and programs for the establishment of uniform military standards and specifications for all items used by the Armed Forces and for those processes and practices essential to the manufacture, packaging, packing, inspection and acceptance of these items.

"3. To establish Department of Defense policies and procedures for the effective utilization of the inspection and testing services and facilities of military and civil agencies.

"4. To supervise and direct the execution of standardization and inspection programs by the military departments.

"5. To coordinate the military standardization program with the civil standardization program of the Federal Government."

The ends of this program are economy and efficiency. The means is coordination.

Achieving standardization in such an extensive program requires the cooperation of all the military depart-

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During Admiral Fowler's service in the Navy he has had broad experience in production methods and techniques. Early in his career he superintended the construction of six river gunboats for the U. S. Navy in Shanghai, China. From gunboats he went to aircraft carriers at the carrier design desk of the Bureau of Construction and Repair, Washington. This was followed by tours as planning officer of the Navy Yard, Portsmouth, N. H., research officer of the Bureau of Ships, Washington, and production officer, Navy Yard, Mare Island, California. During the war he worked closely with industry, as assistant industrial manager in San Francisco, and as commander of the San Francisco Naval Shipyard. Before entering his present assignment, in which he has responsibility for the standardizing and cataloging activities of the Munitions Board, he was Director, Industrial Survey Division, Office of the Secretary of the Navy.

ments and the civil agencies. In this connection, the Standards Agency serves as a clearing house for all standardization efforts being carried on by the military activities in the fields of specifications, standards, packaging, and inspection, and meshing these efforts with those of the civil agencies. It is our responsibility, as I have pointed out in our assigned mission, to coordinate projects and obtain agreement across the board.

The Standards Agency is not an operating activity. The actual work of developing a standard or specification is conducted through task groups and project assignments at the operating level within the departments.

A typical standardization study is conducted in this fashion. A task group, including members from all three military departments and the civil agencies when applicable, is assigned a particular project. One of the military bureaus, technical services, or commands is assigned primary responsibility for coordinating the views of its entire department.

The departmental views are submitted to the task group which resolves difficulties and comes up with a single standard. The finished document is circulated once again for comments or concurrence, with responsibility again resting in a single unit within each department. If concurrence is received, the standard is submitted to the MBSA Advisory Group for final departmental concurrence. When approved by MBSA, the standard then becomes mandatory throughout the military services.

The MBSA Advisory Group consists of a representative from the Army, Navy, Air Force, and the General Services Administration. The GSA representative provides advice, guidance, and liaison to insure that the entire Federal Government standardization effort is synchronized and correlated. I should like to point out that the liaison between the military departments and the General Services Administration is very close. The present GSA member of our advisory group is Daniel Klatzko, Head of the Specifications Branch, Federal Supply Service. His office is in a building immediately adjacent to Barton Hall, where we are situated, and the doors at both buildings are always open. We are presently working together to develop joint procedures for the processing of standards and specifications.

The ultimate objective of the program, jointly conducted by the military departments and the civil agencies is, as I pointed out, economy. But it is not limited to the economy resulting only from the buying of fewer things. The establishment of a single system of specifications and standards and the adoption of uniform packaging and inspection requirements will result in savings all along the line.

It will mean that a single specification will apply when five may have been required before. It will mean that designers will employ standard components which are already carried in stock. It will mean more efficient use of inspection personnel, production people, industrial capacity, supply control personnel. It will make manufacturers happier with Government contracts. It will conserve materials urgently needed for items where substitutes will not serve. All of these factors will result in lower cost to the Government.

In two phases of our operation we have already made important strides in reducing the confusion and inefficiency which result from multiple requirements.

The field of military packaging has been plagued by the problem of overspecification with the result that time, money, and effort have been wasted. We are coordinating packaging specifications across the board to provide adequate, but not excessive, protection for items required by the military services. We are adopting standard procedures which are a part of normal industry operation, relieving producers of the necessity for revamping their packaging production lines. These obvious moves will materially reduce the cost ratio of item to package.

In inspection we have made a significant contribution by reducing from 39 different inspection stamps used by the military departments to a single stamp which will be used by the entire Department of Defense. We have studies underway to provide coordinated inspection requirements which will permit inspection interchange among the services, producing higher efficiency, more effective use of inspection personnel, and better relations with industry. One inspector will serve a plant which heretofore required the full time of several military inspectors representing different services.

In discussing the work of the task groups assigned particular studies, I did not mention the part industry played. I deferred reference to industry until now, because I wish to discuss at some length the major contributions industry is making to our program.

The Munitions Board makes extensive use of Industry Advisory Committees. The results we have had in our standardization effort have been most satisfying. Industry Advisory Groups are established with consideration to geographical location, size of the company represented, and other factors which influence the development of a truly representative cross-section of producers.

Industry participation provides us with current information on precisely what industry is capable of doing in connection with a particular standard. Wherever possible we are adopting industry standards, believing that the interests of the Government will be best served by adherence to the practices and procedures of normal industry operation. We are interested in making industry's job easier, not more difficult. We have been fighting a battle against over-specification, rigid specifications which limit the production base, and standards which sponsor bottle necks.

With the cooperation of industry we are winning that battle.

As you know, it is not our policy in the Munitions Board to deal exclusively with industrial associations. In June, 1948, the Munitions Board issued a policy statement which included the following provisions:

"1. Departments and Agencies of the National Military Establishment

shall avoid the favoring of one association or organization over another.

"2. Participation by Departments and Agencies shall be upon such basis as will avoid:

"*a.* Unauthorized acceptance of legal membership by the U. S. in a private organization.

"*b.* Participation in the management and control of such organizations without Congressional authorization.

"*c.* Participation in the determinations or conclusions of private organizations or associations, in such manner as to suggest compliance therewith by the Government without subsequent responsible administrative authority or Congressional authorization."

This policy to which, of course, we in the Standards Agency must adhere, has caused us some grief. We are currently exploring the possibility of establishing channels within the interpretation of that policy which will enable us to have closer liaison with the work of industrial associations. There is no restriction, for instance, against Federal representatives observing the work of the American Standards Association and similar organizations if we are welcomed to their meetings in that capacity. Much could be gained from familiarity with the problems and solutions coming out of such groups.

Our present thinking tends toward arranging some method whereby industry standards could be coordinated within the military departments before issuance and where proposed military standards could have the benefit of the opinions of industrial standards groups before publication. We believe that the field of standards must be a two-way street for both industry and Government. Engineering knowledge is at a premium in this country and apparently will be for some time. It is essential for us to pool our resources to avoid overlapping and duplication and to take advantage of all of the experience available.

I honestly believe that there is a way to provide mutual benefits to industry and Government within the law in the field of standards.

We have achieved much in that direction already. A close liaison between the American Standards Association and the Federal Government in the field of drawing standards has resulted in the practically simultaneous issuance of standards which conform. There is room for an extension of this liaison. We hope to come up with a plan which will permit broad industrial liaison — an interchange of experience and opinion beyond what we now enjoy.

We do have coordination with industry. In the development of a standard for the military departments, industry is consulted from the beginning. The activity within a military department assigned responsibility for a particular project is charged to coordinate with industry from the outset. But, if there were a single clearinghouse for industry opinion, the speed with which standards could be developed and put to work would be sharply increased.

In that connection, it has been proposed that in addition to sending a copy of coordinated military standards to the ASA Library upon publication, we offer your group a chance for a preview.

This could be accomplished by forwarding a proposed draft to ASA at the same time that it was circulated for the comments of the military departments. Any delay in receiving a coordinated opinion from ASA could be covered by our provision that late comments can be considered in the next revision. This would eliminate delay in processing and would afford an opportunity for us to benefit from your views in preparing subsequent revisions.

We also consider it desirable to have ASA invited to send a representative to attend the meetings of MBSA task groups. We do not believe that there will be any official opposition to such a plan.

There is evidence that ASA drafts circulated to MBSA in the past for comment have not been given the attention and consideration they deserve. That will be rectified.

We further intend to investigate the possibility of having liaison from

(*Continued on page 222*)

Three floors or storage levels in this warehouse can be reached at one time from freight cars loaded and unloaded on this track. Traveling bridges on the two upper floors may be moved the full length of the building as needed.

Official U. S. Navy Photograph

The Navy's Norfolk Supply Center

by Commander R. H. Northwood, SC, USN

Officer in charge, General Stores, Naval Supply Center, Norfolk

YOU are sitting in the middle of the doggondest collection of material that probably you could find in a comparable area any place in the world. We could sell you a 40,000 pound anchor, an electronic tube the size of your tooth, a jet engine, a 40-millimeter gun, or a part for your Uncle Jed's Ford. We carry a total of 435,000 items, worth $535,000,000, and have a covered storage space of more than 8,000,000 square feet. Our monthly sales are at the rate of about $37,000,000 on invoices totalling 100,000 per month.

The Naval Supply Center is the major East Coast distribution point of the Naval Supply System. It supports the vast majority of the ships of the Atlantic Fleet, including those operating in European and Caribbean waters. It looks after all offshore bases in the Atlantic, stretching from Newfoundland to Africa, to Trinidad and Panama. It supports the shore activities in the triangle from Orange, Texas; Key West, Florida; and Norfolk, with the exception of several large shipyards and air stations. Our main effort goes to the ships.

The Navy has recognized certain fundamental differences in handling various types of material by setting up separate depots for each major category. We have a depot for aviation, ship's parts, electronics, ordnance, fuel, and general stores material. Each of these depots maintains stock control, and physically handles the material in receipt, storage, and issue. With the assistance of Electric Accounting Machine equipment, we can tell you at any moment how much we have on hand, how much is due us under contract, how much we have issued in the past 9 months, and where material is physically located.

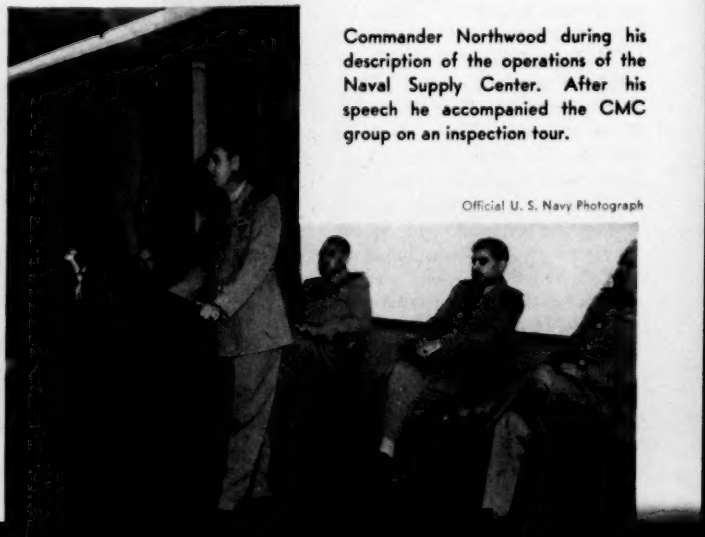
We, at this level, are the staunchest supporters of standardization. We are the victims from lack of it, and are major beneficiaries from any progress. As you know, here in the mines, we make little contribution to standardization, but must depend on the boys at the design desks, whether in the Navy Bureaus or in industry.

The Navy's efforts in standardization have reached in all directions. We could not operate without it. Our supply procedures are so standardized that processing papers in Yokosuka, Japan will be similar to practices here in Norfolk. The organization of Supply Centers, Supply Depots, and Supply Departments have been largely standardized. Can you imagine the confusion of a ship that moves throughout the world, if it had to adapt to new methods at each Navy port of call?

Particular attention has been devoted in the past few years to material standardization, necessitated by the vast increase in item demand of the more complicated modern Navy. One area of note has been in materials handling equipment. The Army, Navy, and Air Force have joined with industry to develop standardization in this field. The Navy alone has 18,500 units of power equipment, spread over 250 activities. As a result of this standardization program, our future fork lift trucks will have been reduced from 117 varieties to only 19. Standardization in this material has been confined to such areas as capacity, size, fork lift height, and load rating. Standards are also specified for location of such operating controls as lift, brakes, accelerators, and steering mechanisms. As you walk through our Repair Shop this morning, please contemplate what standardization can mean in maintaining and repairing this equipment. This standardization has even extended to the methods for training the operators of the equipment.

You may note in our warehouses this morning, the extensive use of pallets. The Navy has now standardized on a 40 x 48 in. pallet, and unit loads on these pallets are now interchangeable throughout the world. The Navy has a standard storage plan outlining methods for storing material of various sizes and weights. Specifications are laid down on storage height, aisle widths and storage aids with a constant view toward conserving expensive space.

(*Continued on page* 222)



Commander Northwood during his description of the operations of the Naval Supply Center. After his speech he accompanied the CMC group on an inspection tour.

Official U. S. Navy Photograph

Specials Can Be Licked

by H. Thomas Hallowell, Jr
President, Standard Pressed Steel Company

TO the modern, volume manufacturer the order for a special part is about as popular as a swarm of bees in a nudist colony.

It can drive him almost out of his mind, even out of business.

And the irony of it is that often the special part—one which the chief engineer of the Oh-Let's-Be-Difficult Company specifies in a new underslung universal widget—isn't necessary at all.

Nine times out of ten, by a slight change in design, a standard item manufactured in volume by at least several blue-ribbon firms will serve just as well.

And that standard part will be far cheaper and delivered much faster.

Specials are uneconomical for everybody—for the customer, for the distributor, and for us, the manufacturer.

I've heard many stories—and some have been almost fantastic—about specials. Too often a weak salesman will insist that the customer wants them! Must have them! Can't use anything else! (Who's he working for?)

A New England manufacturer ordered a new machine from a firm in the Midwest, a machine which his engineers had painstakingly designed at one point so that a shaft would extend through the front instead of, as in the standard arrangement, through the back.

The home office of the machinery firm, thinking of its customer's interest, sent a query to the factory owner in New England. Was it necessary to have the shaft extend through the front of the machine? Did he know he could save several thousand dollars by not having it there? And did he know that delivery would be held up at least two months while the change, trivial to the eye but complicated in terms of internal redesign, was made?

Note: Mr Hallowell is This Month's Standards Personality. See page 219.

"Why, there will be 60 feet of space behind that machine," wrote the grateful New England manufacturer.

There was no reason in the world why the shaft couldn't protrude through the back of the machine!

He got delivery of a standard machine in two weeks and saved several thousand dollars.

I do not mean to say that all specials can be eliminated. They can't. But they can be reduced to a point where the customer saves money and a manufacturer serving industry needn't undermine the stability of his business.

At Standard Pressed Steel Company we have been fighting specials through a formal, carefully planned, and gratifyingly successful program for the last six years.

Specials require special treatment all along the line.

That basically is the problem.

They must be carefully screened, they must be estimated. And a $20 job can often cost more to estimate than a $2,000 job.

Specials require special engineering, expediting, processing, time-study, supervision, inspection, and packaging.

They require special tools, gages, material, and set-ups on machine tools—at least this is true at SPS—and they usually are produced by slower methods due to the low volume per order.

Cost more? Of course they cost more—often ten times more. Not ten percent more! More, in many cases, than you can charge a customer—if you want to keep his business on your standard parts, too.

In our experience at SPS we have had salesmen bring in, say, orders for $1,000 worth of standard items and $50 worth of specials from the same firm. Now, suppose the standards cost us $900 to make. Our profit on them would be $100. On the other hand, suppose it cost us $150 to manufacture the $50 worth of specials (and believe it or not this can happen). On them we would lose $100.

Standards		*Specials*	
Sales Price	$1,000	Cost	$150
Cost	900	Sales Price	50
Profit	$ 100	Loss	$100

$1,050 worth of business and 000 profit! Eliminate the $50 special, then $1,000 worth of business means $100 profit. Amazing, isn't it?

What to do about the specials problem? Can it be solved?

We think it can be, at least in large measure. Already—and years are brief in attempting to reverse what is almost an engineering instinct for specials—we have made remarkable progress at SPS.

The main element in our anti-specials program is education—education of our own people (particularly our salesmen), of our distributors, and of their customers.

We are educating our salesmen through the pocketbook, exerting a reverse incentive by paying no commission on orders for specials. They are, however, well paid to sell standards.

We appeal to the customer. All orders are carefully screened. Where one is for specials, we go back to the customer and ask him if one of our standard bolts or nuts, or other items—the one closest to the special—can't

be made to serve his purpose.

Nine times out of ten a standard item will do the job!

There is the encouragement for the belief that the problem can be solved.

We encourage distributors to visit our big, modern plant in Jenkintown to see how SPS operates, its high level of quality control, its late model, high-production machines and—to see for themselves how disruptive and, therefore, how costly the specials can be when introduced into the ordered flow of production on standards.

We are setting up at our factory in suburban Philadelphia, week-long courses for distributors' salesmen from all over the country. We school them in our products, their applications, our methods, and in the good, sound economics of pushing standards.

We have advertised consistently, and with good humor (see below) in trade journals circulated among our customers, listing and picturing our standard products, and pointing up the dollars-and-cents and time-saving advantages of using standards instead of specials.

A collection of those advertisements, called *Unbrako Standards*, has been placed between covers and distributed widely throughout American industry.

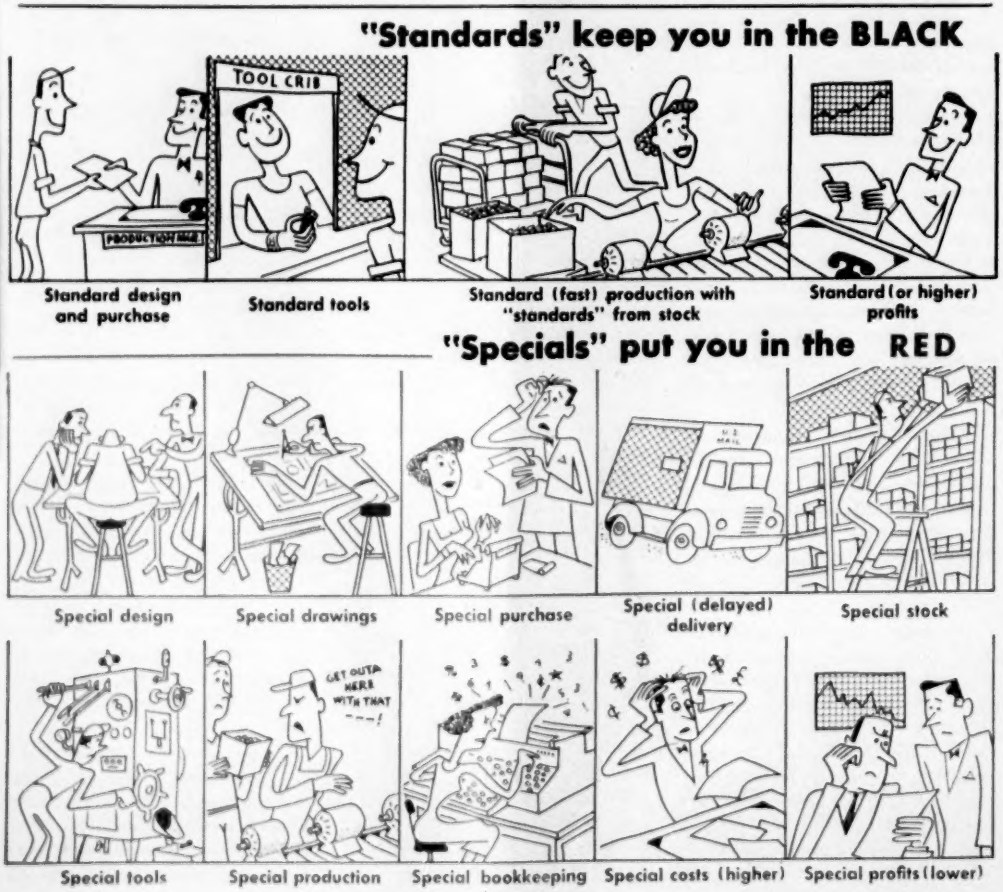
Here we listed the readily available SPS items—the standards—our outstanding distributor organization has in stock in every city and town in our country. And we stated our distributors were "waiting to serve you—why not use this convenience—they even carry the stock so you don't have to! IF it's a standard listed product!"

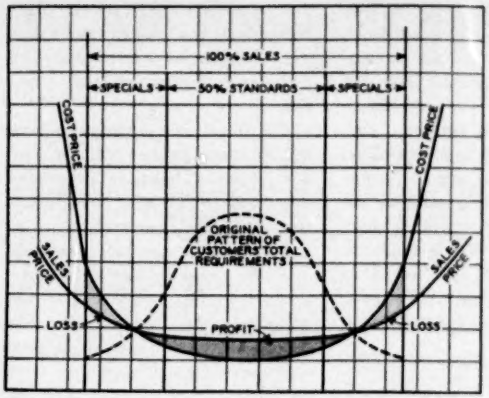
We have made it a point to explain graphically, in detail, to all concerned the reasons for the comparatively high price of specials.

SPS is in business to serve our customers and still make a profit. Service with a profit is the thing that makes the wheels go 'round. There's no greater disservice that an industrial firm can do itself, its employees, its community, and the nation than failing to make a profit.

I can say in all sincerity that in encouraging our customers to buy standards we believe we are per-

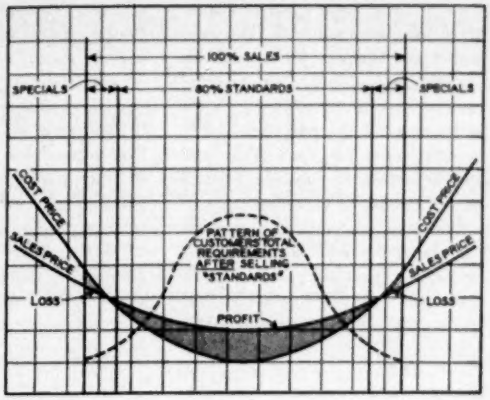
Sample advertisement illustrating how SPS good humoredly points up advantages of standards.





A-1

Here are SPS sales as they used to be. Half of all sales were specials. While profits on standards were fair, the over-all profit picture was badly affected by extremely high losses on specials.



A-2

Dramatic results of SPS program to promote standards are shown here. Eighty percent of the company's sales are now of standard items and the profit picture is greatly improved.

forming an enormously valuable service to every firm that uses our metal fasteners and other products.

An analysis several years ago of our business showed that 50 percent of the orders were specials. (See illustration A-1).

On the special items (See illustration B-1) the following was the case:

a. 20%—a very heavy loss
b. 30%—a slight loss
c. 30%—a slight profit
d. 20%—a reasonable profit

Through our concerted effort to encourage the use of standards, a much greater volume of business is now standard. (See illustration A-2.) And, of course, the profit picture is improved.

By intense concentration on the remaining specials, we have converted a very heavy overall loss into a slight profit. (See illustration B-2.)

Our company accounting is set up so we can determine costs and profits by item groups special and item groups standard. We can further determine, by the pattern of a customer's business, profits by customer.

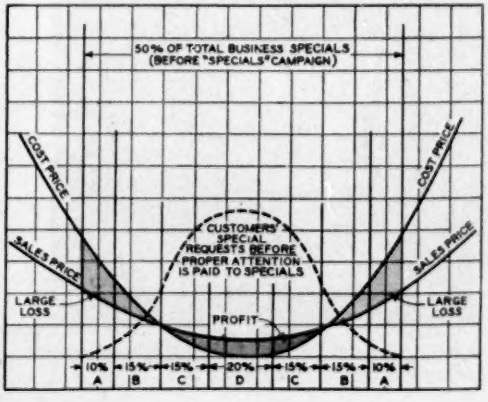
Our program is paying off not only for us but for those firms using our standard parts, because we can now give faster and better service on these standard items and faster and better service on the smaller amounts of specials. Everybody has gained!

There are many ways to illustrate the paralysis that specials exert on a fast-moving production pattern. In one we stress the advances over the years in the machine tool field.

There was the screw-cutting engine lathe dating from about 1875. Then the turret lathe came along in 1885. The single-spindle screw ma-

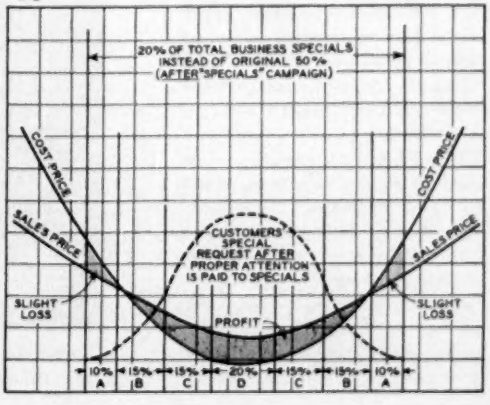
The specials business—half of the entire SPS volume—used to be done at a loss. Here, a breakdown of the specials sales shows 50 percent of them were handled at a slight to a very heavy loss which more than offset slight to reasonable profits on the others.

B-1



Present sales of specials, now 20 percent of the entire SPS volume instead of 50 percent, are broken down here. Because there are fewer sales of specials, SPS has been able to give them more attention and to reduce the extremely heavy losses, showing an over-all profit.

B-2



chine in 1895, the multiple-spindle screw machine in 1905, the cold header and machines for second operations before 1915, and then the complete machines of today, each performing all the operations on a product, taking raw stock in one end and delivering the finished product in vast quantity at the other.

Improved machines and methods have boosted production enormously in the last 50 years. The man who made less than 2,000 bolts per day at the turn of the century now makes 20,000 to 30,000 or more in the same time. That is standard items, of course!

(We can produce our standard products on high-speed modern machines in such quantity per time unit that the price to the consumer is held amazingly low. Since 1943, freight rates are up more than 45 percent, the composite price of steel is up 74 percent and all metal products are up 89 percent. In this period, our average sales prices have gone up less than 15 percent and on some few items we are selling the product for less than we did in 1943!)

But then in comes an order for specials.

To handle them, we must return to the 19th Century, to machine tools which even in 1952 models are still primitive in function. We must turn our backs on the mechanical wizards of mass production.

Say the specials order is for 50 bolts having a shorter thread length than standard. Should the man on the job cut the standard bolt down? He would need a special order to take them from stock. He would have to anneal them, cut them off on a turret lathe, rethread and reharden them, with a possible loss or spoilage which would mean even higher costs and more delay.

Often, it is really easier to make a small lot of new bolts from scratch by a slow method—on a turret lathe. It's long and laborious, but faster than cutting down longer bolts. In the end, we wind up spending $10 on a $1 transaction no matter what we do!

With a lot of business like this, nobody could stay in business long!

A few engineers, in designing machines, get awfully far away from cost realities. These few are careless or indifferent and perform their designing chores with the least bother to themselves. Good engineers, and that means most of them, can think in more planes than one and, while shrewdly designing a machine to serve a purpose, are constantly alert to saving money for their employer by working standard parts into their plans. Good engineers use a special only as a last resort, when a standard will not do the job.

I have heard it said by top-flight design engineers that hitting upon a customer need was five percent of the overall effort in bringing out a new product. They say that 20 percent is in designing a product to meet that need and that 50 percent is in the ingenuity required to produce that product economically. The rest of the effort is expended in removing the bugs from the design and production and in servicing, that is, adapting the product to variations in the need.

The big job is making the product cheaply. And that can't be done by specifying specials right and left. Standard procedure should be standards.

Of course standards are not rigidly fixed now and forever more. They are dynamic. But they are under control. The changes are—or should be—a matter of evolution, not revolution.

The Diesel was a special to locomotive manufacturers not so long ago. Now the Diesej is standard and the steam engine is a special. But the transition was orderly.

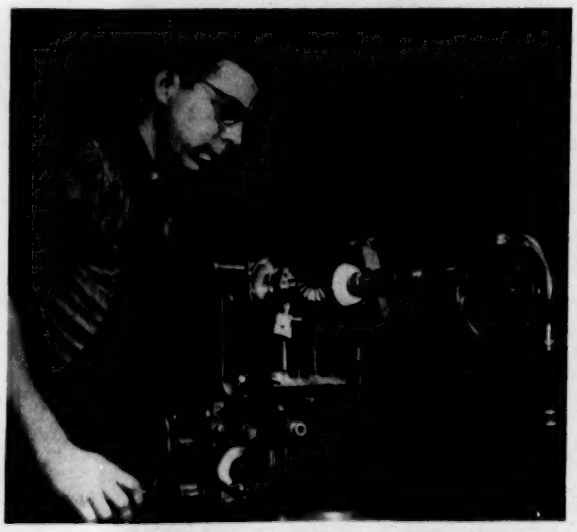
New needs create new standards. What they shall be has to be determined from two points of view—the customer's and the factory's. The standard product is that which meets customer needs and, at the same time, fits into the supplier's production pattern without overtaxing his facilities.

The stock items listed in our catalogs are carefully determined by periodic reviews of the transactions on each item. Slow movers are eliminated wherever the next smaller or next larger size can be substituted.

On our metal shop equipment, a redesign cut parts to one-third as many. But three times as many combinations are now possible! Effort in standardization pays off with tremendous results under today's high-cost conditions.

If the approach is realistic, if we are willing to lop off time-discredited

(*Continued on page 222*)



Cutting edges of tool are dressed on grinder. Sharp production tools cut costs, are standard, too, at Standard Pressed Steel.

An Air Force Experience In Eliminating "Guess Work"

by C. W. Kendall and F. S. Schmitt

Standards for photographic lenses provide definite measurable requirements for equipment needed to insure satisfactory pictures

A Military Standard for photographic lenses, known as MIL-STD-150, was published by the Government Printing Office 23 October 1950. This 34-page document is the first of its kind to be issued by the Munitions Board Standards Agency since the unification of the Armed Services (the Army, the Navy, and the Air Force). However, as early as 1929, the U.S. Air Force (then known as the Army Air Corps) had already begun the preparation of performance specifications for the lenses used in aerial photography.

During the period before the outbreak of World War II, the American Standards Association, alert to the needs of industry and the Armed Services, also began the important task of preparing standards affecting the design, use, and testing of all types of photographic lenses. The list includes approximately 18 standards in the Z22, Z38, and Z52 series which are referenced in MIL-STD-150. The ASA-approved standards include numerous definitions and nomenclature, describe test methods, provide for uniform marking data, etc. These lens standards, through the wide membership of ASA, are now familiar to many expert photographers on the using level. Photographic experts from Hollywood, the freelance field, and from military organizations, have all helped, directly and indirectly, to make these technical documents acceptable to users, designers, and makers of lenses for use in all kinds of picture-taking equipment ranging in size from a huge aerial camera to the familiar, featherweight "Brownie."

The photographic lens standard (MIL-STD-150) represents an effort to combine into one document the basic information needed to procure lenses that may be used for many diversified applications ranging from the production of Hollywood "cheesecake" to aerial reconnaissance and mapping photographs capable of accurately recording cultural, military, and physical features of Mother Earth at incredible heights, day or night. This standard provides the basic data neded for the preparation of specifications for individual items such as aerial lenses, process lenses, motion picture camera lenses, projection lenses, etc,—13 types in all.

The average photographer usually thinks of the term "focal length" as having to do with that characteristic of a lens which, more or less, determines image size. He also probably knows what "back focus" means, and is familiar with telephoto lenses which enable him to utilize more compact equipment than would otherwise be possible. MIL-STD-150, under "Focal lengths and distances," defines nine essential requirements which have to do with focal length, all of which are important in the utilization of lenses in cameras and projection equipment. Similarly, "Aperture and related quantities" defines the various types of apertures and refers to the tests which make each of these definitions a tangible, measurable attribute.

The standard proceeds to define the various lens aberrations and outlines testing procedures—26 methods in all—for specifying and measuring aberrations and other requirements relating to lens performance.

The U.S. Air Force makes effective use of MIL-STD-150 in the preparation of detail specifications covering specific aerial photographic lenses, and has issued specifications based upon this standard, among which are the following:

MIL-L-7368 (USAF)
Lens, Camera, Aerial Reconnaissance and Spotting, 6 Inch, F/6.3, 9 x 9-Inch Format

MIL-L-7367 (USAF)
Lens, Camera, Aerial Cartographic, 6-Inch, F/6.3, 9 x 9-Inch Format

MIL-L-6637 (USAF)
Lens, Camera, Aerial Cartographic, 6-Inch, F/6.3, 9 x 9-Inch Format

MIL-L-7236 (USAF)
Lens, Camera, Aerial Reconnaissance and Spotting, 12-Inch, F/6.3, 9 x 18-Inch Format

MIL-L-4322 (USAF)
Lens, Camera, Aerial Reconnaissance and Spotting, 24-Inch, F/6, 9 x 18-Inch Format

MIL-L-4352 (USAF)
Lens, Camera, Motion Picture, 17, 25, 35, 50 and 75 MM; F/2.8, 16-MM Format

These specifications are, in general, of the performance type. They place considerable emphasis upon picture quality as measured by the photographic resolving power tests outlined in MIL-STD-150. These performance specifications enable the Air Force to obtain lenses of pre-determined quality, insofar as image-forming properties are concerned. They take the "guess work" out of lens performance and substitute definite measurable requirements such as "so many lines per millimeter" in place of such vague terms as "good," "fairly sharp image," "fuzzy," "crisp," "sharp," "hazy," etc.

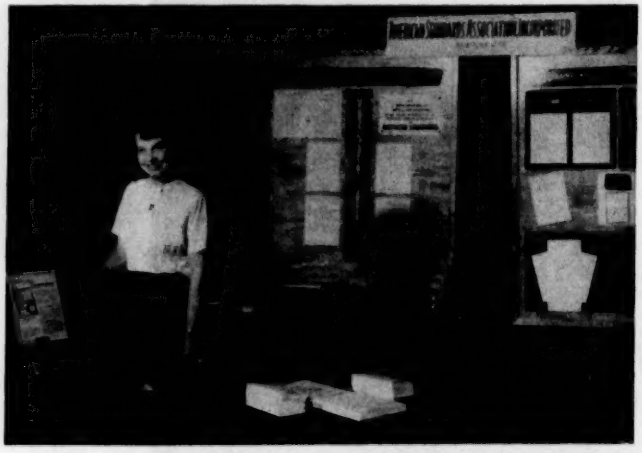
In specifying resolving power as "lines per millimeter," it is necessary to define precisely the kind of test object photographed. This is in the form of a "resolving power target" (see Figure 4 of MIL-STD-150), usually consisting of an arrangement of rectangular bars on a suitable background. The bars and their arrangement are precisely designed, and the contrast between bars and

background is specified. High, medium, and low contrast targets are defined for use with various types of lenses. The exposure and processing conditions for making a photographic "resolving power" test are defined in terms of modern photographic sensitometry, and directions are given so that test plates or films may be processed to a "gamma" which corresponds to that which most commonly prevails in the practical use of each lens. Since the Air Force has adopted the slogan "More Air Power Per Dollar," it is practically mandatory that photographic lenses be procured on specifications rather than on the basis of simple purchase descriptions. Mr Average Photographer, in need of a lens for his view camera, may telephone to his dealer and say: "Joe, send me a 12-inch F/4.5 Supersonic-Fuzzar for use on my 8- by 10-inch view camera,"—and have a reasonable expectation of getting his money's worth. In the first place, he is limiting his order to a definite make and type of lens, with which he is quite familiar, and moreover he is buying from a dealer who will refund his money if the lens proves to be unsatisfactory. Buying for the Government is not quite so simple, and in order to ensure dollar-for-dollar value received, a specification is necessary. Even Mr Average Photographer has to have some kind of a specification, perhaps only a verbal description, which includes the very basic characteristics of the lens, viz—focal length, speed, and coverage. He also knows that by specifying a given make and type he will receive a lens which will perform to his satisfaction for view-camera work.

Following is an example of the use of MIL-STD-150 in the preparation of a specification covering a wide-angle, aerial mapping lens known in the trade as a lens of the "Metrogon" type. Specification MIL-L-7367 (USAF), titled "Lens, Camera, Aerial Cartographic, 6-Inch, F/6.3, 9 by 9-Inch Format" was released 14 November 1951 to supersede U.S. Army Specifications No. 75-146-B for Air Force procurement of this lens. The letters (USAF) indicate that the specification is what is known as a "Departmental" specification, the use of which is mandatory only upon the Department of issue. Ultimately, the majority of these Departmental specifications are destined to become "fully coordinated" Military specifications, mandatory for use by all Military Agencies. A fully coordinated specification is one that has been approved for procurement purposes by the Departments of the Army, the Navy, the Air Force, and the Munitions Board Standards Agency.

In preparing a specification, the check list found in the Appendix is used. This list covers almost all possible characteristics of a lens, and under 13 columns, each headed by a lens "type," are found, opposite each of the characteristics, the notation "O" or "R" indicating whether its inclusion in the specification is "optional" or "required." References to packaging and marking for both the lenses and shipping containers also appear in the "check list." Using this list as a guide, the project engineer or specification writer prepares that part of the specification which deals with performance requirements and testing methods. Under "requirements," the minimum acceptable resolving power is specified for various places in the negative format, including the center and corners. Other important characteristics include equivalent focal length, distortion, relative illumination, reflection-reducing coatings, transmittance, aperture marking, methods of mounting in shutters with dimensions of threads, and mechanical clearance necessary for the lens elements. Tolerances are specified for all measurable requirements. Following the performance and design requirements is the section dealing with test methods.

In addition to performance requirements and test methods, other sections of the detail lens specification deal with packaging and preservation for either domestic or overseas shipment, and contain notes for the guidance of procurement and contract officials who use the document in buying lenses for U.S. Air Force use.



Booth at the convention of the Master Photo Dealers and Finishers Association at St. Louis in May displayed exhibits showing how American Standards are used in the photographic industry. Many questions and comments attested the interest aroused. Miss Carolyn Locher, ASA's engineering assistant in the photographic field, was in charge of this booth.

The standards approved by the American Standards Association aided materially in the preparation and acceptance of this Military Standard by industry and the various activities of the Military Establishment. All military members of the committee, as well as all the representatives of industry, are well acquainted with the standards approved by the Amer-

ican Standards Association. In fact, it is very probable that the personnel of the lens committee which convened at Wright Field in July, 1950, to put the finishing touches to the Military Standard, also contributed largely to the "American Standards" which are listed in the Appendix. Throughout MIL-STD-150, both in the footnotes and in the bibliography, many references are made to standards for lenses approved by the American Standards Association.

The final stages in the preparation of the lens standard serve as a model guide post in showing how industry and the military organization cooperate in the preparation of basic engineering data for procurement purposes. In 1949, following the unification of the Armed Forces, a committee representing the Army, Navy, and Air Force decided to expedite the acceptance and release of a general specification on photographic lenses. This specification had at that time been the subject of several years' coordination. In order to reach mutually satisfactory agreements on definitions, test procedures, etc, the Air Force requested the Munitions Board Standards Agency to call a meeting, in Washington, D.C., of all interested military agencies. The assistance of Dr Irvine C. Gardner of the National Bureau of Standards was requested and he agreed to assist in preparing a workable document. Paul Pryor of the Air Force then prepared a new draft which Dr Gardner reviewed. The data approved by Dr Gardner, prepared in proper form, was then circulated among the military agencies and copies were sent to all known manufacturers of photographic lenses, as well as to important camera manufacturers, with a request that they review the data and come to Wright Field for a meeting to prepare a workable document. Military organizations were also requested to send representatives with authority to bind their agencies so that final decisions could be made and release of the standard could be expedited.

The Military Establishment and the lens industry in the United States were well represented at the meeting. After several days of intensive effort, a document was close to approval. Minor "bugs" existed which the meeting left for the Military to solve. This function was delegated to a committee including Messrs Burke (Army Signal Corps), E. Sewell (Corps of Engineers of the Army), E. Cobb (Bureau of Aeronautics of the Navy), and Paul Pryor of the Air Force. Robert B. Shaw of the Munitions Board Standards Agency was the chairman of all meetings held, both the main meetings of Industry and Military, and the final meetings to "iron out" all minor points of disagreement. To Mr Shaw is due the credit for suggesting that the lens data be prepared in the form of a Military Standard.

Like any document, be it text book

(*Continued on page* 223)

New Guide for Checking Lathe Accuracy

by J. H. Myers
Vice-President, the Lodge and Shipley Company

On behalf of the Committee on Standards, Lathe Group, National Machine Tool Builders' Association

TODAY'S lathes are expected to produce highly accurate work. For this purpose, they have been engineered with great care and built to exacting limits. If the high degree of accuracy required of them is to be maintained, they will need more attention than the superficial checking for level once considered adequate. For this reason, in order that the user may check his lathe from time to time against minimum standards of accuracy and alignment, standards of accuracy for engine lathes and tool room lathes have been developed. These standards were prepared by the Lathe Group of the National Machine Tool Builders' Association, processed through the Sectional Committee on Small Tools and Machine Tool Elements, B5, and have been approved by the American Standards Association.

In preparing the new American Standard for Accuracy of Engine and Tool Room Lathes, B5.16-1952, the Standards Committee of the NMTBA Lathe Group made an intensive study of existing European standards and of the individual standards used by lathe builders in the United States. The new standard resulting from that study has been compiled to cover every phase in the testing of the lathe. It provides a set of tolerances for 12-in. to 18-in., 20-in. to 32-in., and 40-in. to 72-in. lathes. A 36-in. size, included in an earlier American Defense Emergency Standard adopted during the war, has been dropped by all makers since publication of the earlier edition and has not been included in the 1952 standard.

This standard is used by the Lathe Group of the National Machine Tool Builders' Association in the final testing of their product before shipment. The limits indicated for the various tests are outside limits.

Sponsors for Sectional Committee B5, which recommended approval by ASA, are the National Machine Tool Builders' Association, Society of Automotive Engineers, Metal Cutting Tool Institute, the American Society of Mechanical Engineers. The standard has now been published by ASME.

Copies of American Standard, Accuracy of Engine and Tool Room Lathes, B5.16-1952, are available at $1.00.

Standards From Other Countries

MEMBERS of the American Standards Association may borrow from the ASA Library copies of any of the following standards recently received from other countries. Orders may also be sent to the country of origin through the ASA office. The titles of the standards are given here in English, but the documents themselves are in the language of the country from which they were received.

For the convenience of our readers, the standards are listed under their general UDC classifications.

677 Textile Industry

FRANCE	NF
Hemp, jute and sisal cords and strings	G 36-004

GERMANY	DIN
List of various steps in the textile finishing industry	61704
Nominal widths of textile finishing machines	64901
Roller and accessories of lap-machines	64903/4/5
S and Z thread twists	60916
Artificial yarn	60800

INDIA	IS
Fourteen specifications for different cotton fabrics	171, 172, 173, 174, 175, 176, 177, 179, 180, 181, 182, 183, 184, 185
Method for determination of cotton yarn count	237
Method for determination of lea breaking load (strength) of cotton yarn and its count-lea-strength product	239
Method for determination of ends and picks in woven cotton fabrics	240
Method for determination of cotton fabric dimensions	241
Method for determination of breaking load (strength) and elongation of woven cotton fabric (by constant-rate-of-traverse machine)	243
Grading of raw jute (Kutcha assortment)	271
Grading of raw jute (Pucca assortment)	272
Code for seaworthy packaging of cotton textiles	293
Tamarind kernel powder for use in the cotton industry	189

IRELAND IRISH STANDARDS	
Cotton bed sheeting and cotton bed sheets	2:1949
Woolen blankets	26:1950

677 Textile Industry (Cont.)

NETHERLANDS	
Determination of tensile strength and elongation of yarn	979

RUMANIA	STAS
Mixed wool textiles. Overcoat fabric	1613
Mixed wool textiles. School uniform fabric	1615
Silk yarn, natural	1688
Flax fiber	1714
Hemp fiber	1715
Linen yarn	1717
Cotton raw	1840
Hemp yarn	1716
Hemp rope	1930

UNITED KINGDOM	BS
Linen textiles for use by hospitals and local authorities	1781:1951
Tagged boot and shoe laces (cotton)	1801:1951
Condenser bobbins for mules (cotton waste and woollen spinning trades)	1810:1951
Dimensions of flyer bobbins and skewers	1836:1952
Ring doubling frame bobbins for cotton and spun rayon	1809:1951
Shrinkage on laundering of woven cotton and linen fabrics	1118:1952
Elastic braids	1849-50:1952

631.3 Agricultural Tools and Machinery

FRANCE	NF
Sprayer hose connector	U 26-002
Needles for hay-pressing machines	U 34-008

GERMANY	DIN
Hand cultivator	11616
Various agricultural hand tools	11580/1,11586

NORWAY	NS
Garden spades	550
Spading fork, four tines	551
Garden rakes, 10 and 14 tines	552
Garden hoe	553
Horticultural sprinkling and watering system	
Nomenclature of parts and equipment	1667 thru 1670

POLAND	PN
Spring-type cultivator tines, assembly and details	R-58025 thru 58029
Threshing machines. Different types of beaters	R-63001 thru 63005
Plates for reaper knives	R-55007
Finger bar for reapers	R-55031
Finger bar for mowers	R-55032
Plate for mower knives	R-55055
Six standards for different parts of a reaper	R-55061 thru 55066
Three standards for parts of a cultivator	R-58001 thru 58003
Wooden handles	R-56401

631.3 Agricultural Tools and Machinery (Poland) (Cont.)

Plow handles	R-56403

SWEDEN	SIS
Short- and long-handle hand hoes	1451, 1452

621.87 Hoisting Machinery

FRANCE	NF
Cabin equipment of passenger and freight elevators	P 82-205/206
Doors in passenger and freight elevators	P 82-461/462
Sliding doors of elevator landings	P 82-471 thru 474
Dumb-waiter	P 82-481
Two types freight elevators with vertically sliding doors	P 82-482/83

669 Metallurgy

ITALY	UNI
Steel seamless pipes. Quality, specifications tests	663
Round bars for cutting tools (tentative)	3134
Square bars for cutting tools (tentative)	3135
Rectangular strips for cutting tools (tentative)	3136
Microscopic test of ferrous metals (tentative)	3137/8
Hot rolled ordinary steel bands, quality, specification tests	3143
Hot rolled ordinary steel bands. Dimensions and tolerances	3144
Rolled steel sheets, 0.3-4mm thick, for cold stamping. Quality, specifications, testing (tentative)	3145
Rolled steel sheets 0.3-4mm thick, for cold stamping, dimensions and tolerances (tentative)	3146
Forged steel flat bars. Tolerances (tentative)	3147
Forged steel discs. Tolerances (tentative)	3148
Forged steel washers, tolerances (tentative)	3149
Test for hardenability after Jomini	3150
Embossed steel plate, hot rolled, dimensions	3151
Steel castings	3157
Ordinary steel for casting, specifications	3158
Special heat-resisting steel casting (tentative)	3159
Special steel for friction resisting castings (tentative)	3160
Special corrosion - resisting steel for castings (tentative)	3161
Pig lead	3165

MEXICO	DGN
Carbon steel ingots	B 46
Ferrosilicon	B 48

669 Metallurgy (Cont.)

UNITED KINGDOM	BS
Mechanical tests for metals (excluding welds)	Hdbk 13:1951

697 Heating and Ventilating

BELGIUM	NBN
Test method for determination of calorific characteristics of radiators	236

621.13 Railway Steam Locomotives

GERMANY	DIN
Locating bolts with countersunk or fillister heads, long and short, for locomotive construction	30332/3, 30340/1
Hexagon nuts, high and low, left-hand and right-hand thread	30389
Water level indicator shield	33237, B1.2
Bracket seats for the engineers, etc, assembly and parts	36141, B1.1, 2
Turn seats for the engineers, etc, assembly and parts	36143, B1.1, 2, 36144, B1.1, 2, 4
Rivets, countersunk half-round heads for locomotives	30506
Grease cup cover	35545
Plug cock for water level indicator	33048
Water-level holder details	33241/2
Engineer's adjustable seat	36144 B1.3
Coupling	37351
Universal joint	37361
Hinges	31211/2
Hand-lever	30429
Washout valve for locomotive boilers	32135/6
Signal holder for level mounting on locomotives	36001
Signal holder for bracket mounting on locomotives	36004
Special studs	30325
Stop cock's plugs with safety washer and nut	33044
Guard for water-glass	33237, B1.1
Special flanged lock-nuts to locomotives	35338

POLAND	PN
Railway rolling stock. Boiler's valve mounting	K-74110
Railway rolling stock. Boiler oval valves; assembly and details	K-74115 thru 74123
Railway rolling stock. Heating system line: hose, couplings, attachments, etc.	K-75003, 75007/8, 75012, 75014 thru 75018
Railway rolling stock. Locomotive boiler rivets	K-82099
Railway rolling stock. Eye-pins for heating system	K-82132
Railway rolling stock. Crank piece of heating system	K-82900
Railway rolling stock. Coat hook for passenger cars	K-89110, 89111
Railway rolling stock. Spring type holding bolts and yokes	K-91069, 91070

621.3 Electrical Engineering

FRANCE	NF
Rules for the installation and maintenance of electrical appliances	C 11
Receptacles, plugs, etc of explosion-proof type	C 63-384

POLAND	PN
Fuse and fusebox for motor vehicles	S-76080/1
Metal protective tubing for electric wiring on motor vehicles	S-76087

UNITED KINGDOM	BS
Audio-frequency transformers for cinematograph equipment	1793:1952
Colour code for fixed resistors for telecommunication purposes	1852:1952
Tubular fluorescent lamps (class MCF/U)	1853:1952
Power rating of valve-driven high-frequency induction-heating equipment	1799:1952
Colour code for twin compensating cables for thermocouples	1843:1952
Enamelled round copper wire (enamel with vinyl acetate base)	1844:1952

621.88 Means of Attachment, Fastenings

AUSTRIA	ÖNORM
Filister-head machine screws, M1 to M10	M 5133
Studs, M3 to M52	M 5151/2

FRANCE	NF
Oval-lead machine screws with pilot end	E 27-127
Cup washers	E 27-619
Turnbuckle	E 82-001

GERMANY	DIN
Metric screw threads, four series	13,B1.12
Gages for bolts with metric thread	13,B1.16
Gages for nuts with metric threads	13,B1.17
Plain stop rings with set screws	703
Safety snap-rings for shafts	471
Safety snap-rings for holes	472

ITALY	UNI
Seventeen tentative standards for different types and sizes of socket wrenches	3116 thru 3133
Five standards for wood screws	3152 thru 3156

NETHERLANDS	N
Round screw thread	1662
3 standards for different wood screws	1715-1717
Round, hexagon socket head bolts, metric thread	1241

621.88 Means of Attachment (Cont.)

POLAND	PN
Oval-head carriage bolts	M-82411
Oval and flat-hammer-head carriage bolts	M-82511/12
Belt-joining rivets	M-82961

SWEDEN	SIS
Wrenches for hexagon socket head screws	R 795
5 standards for different type studs, short and long	1459 thru 1463
Disc screws with hexagon hole, metric thread	1475
Countersinking and counterboring for machine screw heads	1509, 1510
Four types of self-tapping screws	1519 thru 1522
Diameters of holes for self-tapping screws	1523

UNION OF SOVIET SOCIALIST REPUBLICS	GÖST
Hexagon-socket head machine screws	5993
Round screw thread for electric lamp bases and sockets	6042

YUGOSLAVIA	JUS
Definition of screw thread	M.BO. 001
General survey of standards on screw threads	M.BO. 003
Definition of metric thread	M.BO.010
General survey of metric threads	M.BO.011
Five standards for metric threads series, "A", "B", "C", "D", "E".	M.BO. 012-016
Whitworth thread, definitions; basic dimensions; pipes, straight and taper.	M.BO. 050; M.BO. 051; M.BO.056

651 Office Organization, Office Management

GREAT BRITAIN	BS
Sizes and recommended layout of commercial forms	1808:1951

662.9 Heating Apparatus and Methods

AUSTRIA	ÖNORM
Gas water heaters, testing of	M 7412

POLAND	PN
Classification of coke	C-02050
Blast furnace coke	C-97952
Coal storage. General rules	G-07010
Coal storage record keeping forms	G-07021
Signs for the identification of various kinds of coal in coal yards	G-07025

RUMANIA	STAS
Raw lignite from Armenis basin	1643
Petroleum coke for foundry work	1644
Coal from Baia-Noua basin	1721
Lignite from Ojasca basin	1778
Coal from Anina basin	1931
Sectional radiators for central heating	1597
Cast iron radiators	1676

AMERICAN STANDARDS

Status as of June 6, 1952

Standards Council — Approval by Standards Council is final approval as American Standard; usually requires 4 weeks

Board of Review — Acts for Standards Council and gives final approval as American Standard; action usually requires 2 weeks

Correlating Committees — Approve standards to send to Standards Council or Board of Review for final action; approval usually takes 4 weeks

Building

In Board of Review—

Sand-Lime Building Brick, Specifications for, ASTM C73-51; ASA A78.1 (Revision of ASTM C73-39; ASA A78.1-1942)
Sponsor: American Society for Testing Materials

Excavations and Foundations, A56.1
Sponsor: American Society of Civil Engineers

Non-Slip Oxychloride Composition Flooring and Its Installation, Specification for, A88.5

Terrazzo Oxychloride Composition Flooring and Its Installation, Specification for, A88.6

Industrial Granolithic Oxychloride Composition Flooring and Its Installation, Specification for, A88.7

Oxycement Underlayment and Its Installation, Specification for, A88.8

General Purpose Flooring and Its Installation, Specification for, A88.2 (Revision of A88.2-1951)

Heavy Duty Flooring and Its Installation, Specification for, A88.3 (Revision of A88.3-1951)

Base Coat Flooring and Its Installation, A88.4 (Revision of A88.4-1951)
Sponsors: American Society for Testing Materials; National Bureau of Standards

In Correlating Committee—

Building Code Requirements for Structural Steel (Riveted, Bolted, or Welded Construction), A57.1 (Revision of A57.1-1943)
Sponsor: American Society of Civil Engineers; American Society of Steel Construction

Seamless Copper Pipe, Standard Sizes, ASTM B42-51; ASA H26.1 (Revision of ASTM B42-49; ASA H26.1-1949)

Seamless Red Brass Pipe, Standard Size, ASTM B43-51; ASA H27.1 (Revision of ASTM B43-49; ASA H27.1-1949)

Seamless Copper Water Tube, ASTM B88-51; H23.1 (Revision of ASTM B88-50; ASA H23.1-1949)

Copper-Silicon Alloy Wire for General Purposes, ASTM B99-51; ASA H30.1 (Revision of ASTM B99-49; ASA H30.1-1949)

Copper and Copper-Base Alloy Forging Rods, Bars, and Shapes, ASTM B124-51; ASA H7.1 (Revision of ASTM B124-49; ASA H7.1-1949)

Brass Wire, ASTM B134-51; ASA H32.1 (Revision of ASTM B134-50; ASA H32.1-1951)

Leaded Red Brass (Hardware Bronze) Rods, Bars, and Shapes, ASTM B140-51; ASA H33.1 (Revision of ASTM B140-50; ASA H33.1-1951)
Sponsor: American Society for Testing Materials

Standard Submitted—

Recommended Practice for Thermal Analyzing Steel, ASTM E14-15; ASA Z30.2 (Revision of ASTM E14-33; ASA Z30.2-1936)

Chemicals

In Correlating Committee—

Spirit of Turpentine, Specifications for, ASTM D13-51; ASA K32 (Revision of ASTM D13-34; ASA K32-1937)
Sponsor: American Society for Testing Materials

Consumer

In Standards Council—

Standards for Rayon Fabrics, L22
Sponsor: National Retail Dry Goods Association

Electrical

In Board of Review—

Rated Control Voltages and Their Ranges for Alternating Current Power Circuit Breakers (Revision of C37.8-1945), C37.8
Sponsor: Electrical Standards Committee

Tinned Soft or Annealed Copper Wire for Electrical Purposes (Revision of ASTM B33-50; ASA C7.4-1951) ASTM B33-51; ASA C7.4

Soft Rectangular and Square Bare Wire for Electrical Conductors (Revision of ASTM B48-49; ASA C7.9-1951) ASTM B48-51; ASA C7.9

Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members for Electrical Conductors (Revision of ASTM B172-50T; ASA C7.12-1951) ASTM B172-51T; ASA C7.12

Rope-Lay-Stranded Copper Conductors Having Concentric and Stranded Members for Electrical Conductors (Revision of ASTM B173-50T; ASA C7.13-1951) ASTM B173-51T; ASA C7.13

Bunch-Stranded Copper Conductors for Electrical Conductors (Revision of ASTM B174-50T; ASA C7.14-1951) ASTM B174-51T; ASA C7.14
Sponsor: American Society for Testing Materials

In Correlating Committee—

Power-Operated Radio Receiving Appliances, Revision of C65.1-1942
Sponsor: Underwriters' Laboratories

Interrupting Rating Factors for Reclosing Service on Power Circuit Breakers, C37.7 (Revision of C37.7-1945)

Guide Specifications for A-C Power Circuit Breakers, C37.12
Sponsor: Electrical Standards Committee

Mechanical

American Standards Just Published—

Accuracy of Engine and Tool Room Lathes, B5.16-1952 $1.00
Sponsors: National Machine Tool Builders' Association; Society of Automotive Engineers; Metal Cutting Tool Institute; The American Society of Mechanical Engineers

Ring-Joint Gaskets and Grooves for Steel Pipe Flanges, B16.20-1952 $1.00
Sponsors: Heating, Piping, and Air Conditioning Contractors Association; Manufacturers Standardization Society of the Valve and Fittings Industry; The American Society of Mechanical Engineers

In Correlating Committee—

Preferred Thicknesses for Uncoated Thin Flat Metals (Under 0.250 In.), B32.1 (Revision of B32.1-1941)
Sponsors: American Society of Mechanical Engineers; Society of Automotive Engineers

Free Cutting Brass Rod and Bar for Use in Screw Machines, ASTM B16-51; H8.1 (Revision of ASTM B16-49; H8.1-1949)
Sponsor: American Society for Testing Materials

Mounting Dimensions of Lubricating and Coolant Pumps for Machine Tools, B5.28
Sponsors: American Society of Mechanical Engineers; Metal Cutting Tool Institute; National Machine Tool Builders Association; Society of Automotive Engineers

Office Standards

In Correlating Committee—

Provisions for Installation of Telephone Equipment on Desks, X2.1.2
Sponsor: National Office Management Association

Photography

In Correlating Committee—

Spectral Densities of Three-Component Subtractive Color Films, PH2
Sponsor: Photographic Standards (Correlating) Committee

Safety

American Standard Just Published—

Manual of Accident Prevention in Construction, A10.1-1951 $3.00
Sponsor: The Associated General Contractors of America

In Correlating Committee—

Safety Code for Mechanical Power-Transmission Apparatus (Revision of B15-1927)
Sponsors: Association of Casualty and Surety Companies, Accident Prevention Department; International Association of Governmental Labor Officials

What's New on American Standard Projects

Pipe and Pipe Fittings, B16—

Sponsors: American Society of Mechanical Engineers; Heating, Piping, and Air Conditioning Contractors Association; Manufacturers Standardization Society of the Valve and Fittings Industry.

Both the Chemical Industry Correlating Committee and the Mechanical Standards Committee have concurred in a request to the American Society for Testing Materials that ASTM give consideration to the establishment of standard specifications for IPS pipe in a variety of corrosion-resistant metals. By letter dated May 14, ASTM was asked to consider establishment of specifications for pipe made of Nickel; Monel; Iconel; Hastelloy B; Hastelloy C; Copper; Silicon Bronze; Admiralty Metal; 70-30 Copper Nickel; Type 2S Aluminum; taking into account the nominal size ranges and schedule numbers according to American Standard B36.19-1952. It was also requested that standard wall thicknesses be adopted comparable to those contained in this American Standard.

Progress Reported in Work on Uniform Graphical Symbols—

(Reprinted from *Electrical Engineering*, May 1952)

Graphical symbols for electrical engineering can be a shorthand that all electrical engineers, electrical technicians, and draftsmen can understand or they can be only a means of cramming a great deal of information into a small space on a given drawing. The latter case is true when every organization has its own symbols. Then an engineer cannot be sure when he reads a schematic that originated in another organization that he understands what each symbol means. In order to be sure, a legend must accompany every diagram stating for what each symbol stands.

Engineers in many organizations must draw and explain schematics for use in their own organizations, by their customers, and on contract, by other organizations and the Armed Services. Sometimes the contracting organization can persuade its customers to accept schematics and the corresponding instruction manuals with symbols which are unique to the contracting organization. In this case, the customer is forced to train its technicians in two symbol languages: first, the symbol language it uses normally; and second, the symbol language unique to the contracting organization.

In the long run, it seems logical that, in the best interests of all engineers, electrical technicians, draftsmen, the Armed Services, and all other organizations, there should be only one symbol language.

Can such a language be agreed upon? Great progress has been made in the past year in creating confidence among the workers in this field that a single language is attainable. In the first place, an ASA task group[1] has prepared a draft applicable to the fields of telecommunications, control engineering, and power engineering. There have been 12 meetings of the task group. The first meeting was on December 15, 1950; the most recent, on February 15, 1952. Each meeting lasted one day. At these meetings each representative of an organization made proposals or counter proposals prepared by the group he had formed in his own organization to discuss the progressive drafts as they were circulated.

In the second place, a representative from industry sat with the Munitions Board Standards Agency (MBSA) task group, which group was charged with reviewing JAN-STD-15 and with preparing a draft of MIL-STD-15A to replace it. The first draft has been circulated for comments to members of the ASA task group as well as to the members of the MBSA task group. A representative from the Defense Department of Canada sat with the ASA task group during three of the more recent meetings.

In the third place, a U. S. expert sat with the International Electrotechnical Commission (IEC) task group of experts authorized to review IEC Publication 35 (Power Symbols) and to prepare a draft of a new standard to replace it. It was agreed at this meeting that experts of the telecommunications industries should meet simultaneously with experts of the power industries to decide on mutually acceptable symbols. Some work on the new draft was accomplished at the three-day Montreux meeting of the IEC task group in November, 1951. The remainder is scheduled to be accomplished during a three-day Paris meeting of the IEC task group which is to be held in May, 1952. [This meeting was postponed until September.]

Change for the sake of change is not necessarily an improvement; but the change that is adopted so all can agree is progress. An engineer, by the nature of his training, tends to look at problems objectively, review all the facts, and then propose a solution that is likely to be acceptable, with a few amendments, to all concerned. It has been found by experience that conflicts in standards between strong groups in any one organization ordinarily cannot be resolved within that organization. However, when representatives of these groups meet in a task group with representatives of other organizations, mutually satisfactory compromises usually can be evolved.

[1] This is a subgroup of ASA Sectional Committee Y32 on Graphical Symbols and Designations, sponsored by the AIEE and the ASME.

Abbreviations, Y1—

Sponsor: The American Society of Mechanical Engineers

This committee replaces the former ASA Committee Z10 on Abbreviations for Scientific and Engineering Terms. The new committee's organizational meeting was held on October 22, 1951.

The committee is to confine its considerations to the abbreviations of terms used in engineering, the physical sciences, and technology. An abbreviation is defined as a "shortened form of a term exclusive of symbols and designations."

Standardization of Graphics, Y15—

Sponsor: American Society of Mechanical Engineers

Under the procedures of the American Standards Association, work has continued this past year on revising present American standards in the general field of graphics. The intent is to promulgate standards and recommendations to be published in pamphlet form which will (1.) Improve the legibility and quality of illustrations used for lantern slides and publications; (2.) Provide guidance material for the designer of time-series charts.

The main idea behind standardizing illustration methods is to give authors simple, fundamentally sound and systematic means for obtaining effective and legible reproductions, either projected or printed.

The ASA project is being handled by three subcommittees: Lantern Slides, Y15.1; Time-Series, Y15.2; and Publications, Y15.3. Their progress is reviewed periodically by the Y15 Sectional Committee under the chairmanship of Douglas P. Adams, Massachusetts Institute of Technology. Various scientific and engineering societies, also other interested groups, are represented on the sectional committee and its subcommittees.

Early plans called for a revision of the two existing standards; Z15.1-1932—Engineering and Scientific Charts for Lantern Slides; and Z15.3-1938—Engineering and Scientific Graphs for Publications. Until last May, revision of these standards had been carried on by the two subcommittees already noted. At that time, it was decided to combine these two standards into one. Since then, the respective subcommittees' activities have been directed toward compiling a new standard tentatively titled "Illustrations for Lantern Slides and Publications."

As now planned, this standard will cover the following general subjects: a guide for authors on planning and designing original copy; general recommendations and standards on copy dimensional specifications for illustrations suitable for use both as slides or for illustrating a publication; specialized illustrations for publications; and specialized copy for lantern slides. Recommendations will cover graphs, charts, tabular statements, mechanical and schematic drawings, and other illustrations of objects or relationships. The standard will apply to various scientific fields, industrial technology, finance, education, and medicine.

The proposed standard will cover the preparation of dual-purpose illustrations suitable for both slides and publications. It is believed this will generally benefit authors who do not wish to prepare separate illustrations for their slides and manuscripts. Publishers should benefit also since lantern-slide copy when properly prepared will generally be suitable for publications. A preliminary draft of the standards relating specifically to the preparation of dual-purpose illustrations is shortly to be reviewed by several publishers in technical fields who view the proposal with interest. The dual-purpose standard will be essentially the same regarding copy dimensional specifications as those given in Figure 1 in an article by the writer, published in 1949.[1]

Decision to produce the combination standard was predicated largely on results from an extensive questionnaire survey conducted early last year by the Y15.1 Lantern Slide Subcommittee. Among the more interesting results were these:

1. About eight out of nine authors of technical papers use some or all of their lantern-slide originals in publications of various kinds.
2. A majority of authors employ effective methods in preparing lantern slide copy, and about a third do not.
3. Roughly three out of four use graphs or drawings in their displays, and 50 per cent show slides of photographs or micrographs.

The respondents in this survey were chiefly readers of *C&EN* who were known to have some interest in lantern slides. Over-all, the survey showed that the kind of standard now planned is much needed. In effect, this will be similar to the present Society publication, *Hints to Authors*, but broader in scope.

The Lantern Slide Subcommittee compiled a preliminary draft of their standard guided by the results of the questionnaire survey. This draft is being reworked to include information on preparation of illustrations for publications. The first draft of this new standard may be ready for review in 1952.

Revision of the time-series standard is well advanced. It is possible that this project will be completed this year.

Reported by L. S. Bonnell, *Chemical and Engineering News*, April 1952.

[1] Bonnell, L. S., Preparation of Effective Lantern Slides, *Chemical and Engineering News*, 27, 2601 (1949).

Photographic Processing, PH4—

Sponsor: Photographic Standards (Correlating) Committee

The following standards have received approval by the sectional committee and should be published early this year:

PH4.2 American Standard Specifications for Sheet Processing Tanks
PH4.3 American Standard Specifications for Photographic Trays
PH4.4. American Standard Specifications for Photographic Hangers (Channel-Type) (Plates and Sheet Film)
PH4.105 American Standard Specification for Photographic Grade Sodium Acid Sulfate, Fused
PH4.275 American Standard Specification for Photographic Grade Sodium Sulfite (Revision of Z38.8.275-1948)

The revised specification for photographic grade sodium sulfite PH4.275, includes (1) a slightly higher minimum assay requirement, (2) a tighter limit for thiosulfate as an impurity, and (3) revised procedures for the assay, alkalinity, thiosulfate, heavy metals and iron determinations. The present specification, Z38.8.275-1948, permits 0.1 percent of sodium thiosulfate as an impurity. There is some indication that this amount of thiosulfate in sulfite used in a high-sulfite low-activity developer may result in some loss in film speed. A thiosulfate limit of 0.5 percent appears quite satisfactory and is included in the revised specification. The revision of the assay procedure is editorial. The revisions of the procedures for the alkalinity and thiosulfate determinations are designed

to permit more accurate determination in view of the relatively tight limits specified. The revised procedure for determining heavy metals and iron should minimize interference of heavy metals in evaluating the iron content and should result in more reliable determinations.

Sectional Committee PH4 considered proposed standards for (1) Temperature of Photographic Processing Solutions (revision of Z38.8.1-1944), (2) Photographic Grade Thermometers (revision of Z38.8.11-1948), (3) Photographic Graduates (revision of Z38.8.12-1948), (4) Photographic Grade Blotters, (5) Conversions of Weights and Measures for Photographic Grade Ammonium Chloride, (6) Photographic Grade Ammonium Sulfate and (7) Method of Determining the Thiosulfate Content of Processed Photographic Film. The following proposed standards were voted to letter ballot of the sectional committeee at the meeting of January 22 and 23, 1952:

PH4.10 Proposed American Standard Specifications for Photographic Blotters
PH4.183 Proposed American Standard Specification for Photographic Grade Ammonium Chloride
PH4.184 Proposed American Standard Specification for Photographic Grade Ammonium Sulfate

Sectional Committee PH4 has during the past year received from the editors of two of the leading photographic journals a request that it consider the drafting of an American Standard Definition for a Fine Grain Developer for Photographic Films. Such a standard is apparently desired as a basis for evaluating the claims made regarding fine grain developers either by advertisers or authors submitting copy for publication. The Subcommittee on Processing Procedures, PH4-2, is considering the question of the definition of a fine grain developer. It is realized that the actual test methods would involve evaluation of speed and relative graininess. Since this is fundamentally a matter of sensitometry, it is planned to ask the cooperation of Sectional Committee PH2 on Photographic Sensitometry in drafting the test methods.

It has been proposed that a standard be prepared for limits of impurities for water for photographic processing. There is some question as to whether this information desired by processors and photofinishers could best be handled by a technical publition or as an American standard. It appears that what is wanted is (1) information as to the effect of specific impurities in water on various processing operations, (2) the desirable limits for these impurities for water used in these operations and (3) methods for treating available water supplies to meet these minimum requirements. A special subcommittee was appointed to proceed with the drafting of such a standard.

The Subcommittee on Specifications for Photographic Chemicals, PH4-1, is developing proposed specifications for photographic grade ammonium thiosulfate solution and crystalline ammonium thiosulfate. Consideration is also being given to the desirability of specifications for several additional chemicals including anhydrous citric acid and sodium tetraborate (pentahydrate). Revision of several of the existing specifications for photographic grade chemicals which received final approval in 1948 and 1949 is also being considered. The subcommittee is pleased to note that the technical requirements and test procedures in recent federal specifications for photographic chemicals are in general identical with those contained in the corresponding American standards.

Reported by Carroll V. Otis in *Chemical and Engineering News*, April 1952.

Letter Symbols, Y10—

Sponsor: American Society of Mechanical Engineers

Committee Y10 has reached substantial agreement on a set of general principles to govern the selection of letter symbols, although it has not officially adopted them. A copy of this report on general principles is obtainable from A. A. Bennett, Brown University, Providence, R. I.

This Month's Standards Personality . . .

H. THOMAS HALLOWELL, JR, 44-year-old president of Standard Pressed Steel Company of Jenkintown, near Philadelphia, is one of the country's most progressive young industrialists.

A native Philadelphian and a graduate of Swarthmore College where he starred at football and lacrosse, Hallowell is economist, inventor, and a foremost spokesman for the use of standard products throughout industry.

He has made the capital investment theory an unfailing practice at SPS and under it turns back 80 percent of the profits into the company for new and better tools and buildings. So, as a result, SPS has increased its output vastly and reduced the unit cost of products. And thus the company has been able to boost wages, improve conditions and, at the same time, hold down the price of products to the consumer.

SPS, which marks its 50th anniversary next year, is the world's largest producer of socket screws. It also manufactures locknuts, precision aircraft parts, and steel shop equipment.

News Briefs

• • **Houser Elected**—In a short business session during its meeting at Norfolk, May 21 and 22, the Company Member Conference elected P. L. Houser, Supervisor of Manufacturing Standards, International Harvester Company, Chicago, as a member of its Administrative Committee. Mr Houser will complete the unexpired term of Forrest Nagler, Allis-Chalmers Manufacturing Company, who resigned from the committee as a result of his retirement early this year.

• • **Members of the American Standards Association's Committee on Procedure** have been named for the coming year. This committee is responsible for advising the Standards Council and the Board of Directors on any question that concerns interpretation of the Constitution, By-Laws, and rules of procedure in connection with the development or approval of American Standards. Members are:

A. E. Pringle, II, Vice-President, The Pringle Electrical Manufacturing Company, Philadelphia, Pa.
Merwin Brandon, Vice-President, Underwriters' Laboratories, Inc, New York, N. Y.
H. R. Huntley, Transmission Engineer, American Telephone and Telegraph Company, New York, N. Y.
E. O. Mattocks, Engineer, American Petroleum Institute, New York, N. Y.
T. B. McMath, Director, Boiler and Accident Prevention Division, Maryland Casualty Company, Baltimore, Maryland
Maurice N. Quade, Parsons, Brinckerhoff, Hall and Macdonald, New York, N. Y.

• • **Standards made headlines** recently when the Food and Drug Administration set new standards for bread. Banning the use of emulsifiers, FDA explained that they could deceive consumers on the age of the bread, and that they have not been adequately tested for safety for human consumption. Exclusion of the chemical softeners was in line with recommendations of the American Bakers Association, according to Curtiss H. Scott, chairman of the Association. Other organizations called the action "discriminatory and illegal," however.

The standards become effective August 13. After that date standard white bread may not contain more than 3 per cent corn flour, potato flour, rice flour, soy flour, and various food starches and dextrinized starches. Larger amounts, FDA explains, would change the composition, appearance, and flavor of the bread so that it would no longer be the same as breads which comply with the standards. Other provisions include:

1. A limit of moisture content to 38 per cent and a minimum of 68 per cent solids;

2. A ban on the adding of insignificant amounts of "fad" ingredients as a basis for exaggerated claims;

3. Whole wheat bread must be made of 100 per cent whole wheat flour; milk bread must be made with whole milk as the sole moistening ingredient (or an equivalent amount of other milk products); raisin bread must contain a minimum of 50 parts by weight of raisins to each 100 parts of flour;

4. All non-standard varieties of bread, such as rye, pumpernickel, and others, must have a complete list of ingredients on the label.

• • **Referring to the recently published American Standard,** Square and Hexagon Bolts and Nuts, B18.2-1952, the magazine *Steel* comments:

"The new standard eventually will benefit both producers and users of fasteners. The number of items made will be reduced; inventories of manufacturers, distributors and users will be simplified; and the number of wrench openings involved in the handling of these fasteners will be cut by at least 40 per cent.

"At first glance the standards may confuse some consumers. Certain sizes are included which, while now specified, can easily be eliminated by industry cooperation. Realists point out that only when consumers restrict their specifications to the new recommended standards can the program be pronounced a success. In short, here is a definite challenge to industry cooperation."

Early in this century, the U. S. had as many as 15 different kinds of light sockets. Each manufacturer made his own type and tried to freeze out the competitors. Then a manufacturer began to make a gadget which would adapt different sockets and electric lamps to each other. Standardization eliminated this chaos, created a national market for lamps, and helped to reduce the price of a 60-watt lamp from $1.75 in 1907 to around 15 cents today.

About Standards

(*Continued from page* 202)

velopment to obtain the maximum performance of all parts of the airplane. If a better instrument is developed or a better radar built, it should be backfitted into existing airplanes, if justifiable and practicable, as soon as available. To make this possible, it is essential that the new device replace the existing one identically, or very nearly so, in regard to weight, center of gravity location, size, support joints, connections, and power supply. Some of these interchangeability requirements may be reduced, of course, if there is enough gain to justify changes. However, it is seldom desirable to compromise much on either weight or size since the airplane is customarily affected too much by changes in these characteristics. Too many airplanes are improved out of existence.

It might appear that if interchangeability is a requirement, identity would further simplify logistic and supply problems. As far as the supply system afloat is concerned, this does not necessarily follow at all. Under the naval aviation supply system, when a part of the airplane needs replacement, it is replaced on a free exchange basis; i.e., the squad-

ron turns in the damaged piece of equipment and draws a replacement. Both the squadron and the supply officer need only concern themselves with whether the replacement equipment is interchangeable, performance- and installation-wise, with the displaced part. Most of the parts and equipment so displaced are then returned by the supply system to an overhaul and repair department which examines, tests, and overhauls, if necessary. The increasing complexity of modern aircraft and equipment requires more and more that parts be examined and overhauled only by experts. Therefore, it is apparent that, as far as the operating forces are concerned, interchangeability as a whole part is essential, whereas interchangeability of parts of a whole means little. It is true that the overhaul and repair department's problems are complicated in overhaul by a wide variety of similar instead of identical pieces of equipment, but, again, not unduly so if the variety is kept at a minimum. Here the ruling factor of maximum performance will almost insure a minimum of variety of competing parts and equipments.

In the case of ships the problem is quite different. There are so few carriers in operation that standardization of ships is impractical and perhaps even undesirable. Here, again, however, much equipment and various parts of the ship are standard and interchangeable to some degree. An example is the recent installation of the bow of the *Hornet* on the *Wasp*, replacing the one lost by collision. Also, carriers are not designed to operate as close to the ideally attainable performance as are aircraft, and are intended to operate for years instead of months. Hence, a greater degree of standardization of parts and equipment is practicable. On the other hand, carriers are subjected to periodic face-lifting to bring them up-to-date, departing still further from standardization as complete ships. A way of summing up the situation in ships might be to say, then, that where there are enough parts to be produced to justify standardization, rivets for example, standardization has been pretty well achieved.

One thing that has been very well standardized on carriers is equipment of all kinds, types, and descriptions from main engines to dish washers, generators to radars. The several classes of carriers do have various amounts and arrangement of equipments but the equipment itself is pretty well standard. This has been of major assistance in the operation and maintenance of these ships.

Summarizing, then, what I hope I have said, as far as aeronautics is concerned: 1. By all means set performance standards of all kinds for development, design, manufacture, and test. 2. By all means prescribe standards of interchangeability. 3. By all means exercise what might be called voluntary standardization instead of standardization by fiat. 4. By no means standardize on parts or equipment whereby the combat performance of the airplane is unduly

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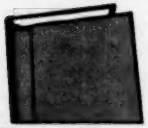

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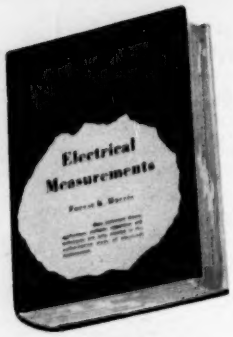

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Munitions Board

(*Continued from page* 205)

the Department of Defense at task group sessions of ASA which are known to be of interest to the Department.

It is believed that such practices will provide a practical approach to a relationship with ASA or any other standardization organization within the policy established by the Munitions Board.

In closing I should like to emphasize that the Munitions Board Standards Agency earnestly solicits the comments of the American Standards Association on those Military Standards which have been issued to date. Standards to be effective must be susceptible to change. We are determined to have effective standards and therefore we shall be modifying them constantly in line with new developments and experience.

The American Standards Association can make a real contribution to the operation of the Federal Government by submitting constructive criticism on the work of the Standards Agency. Candor and honest differences of opinion can lead to a closer relationship between industry and Government than has heretofore been achieved.

Specials Can Be Licked

(*Continued from page* 210)

notions and attitudes, there is nothing really complicated in the picture of standards versus specials. We've got to stop saying such silly things as: "Specials can be made as cheaply as standards!" "Set-ups are overhead!" "Special crating or packing is shipping expense!" "Our competitors can do it for the price!" (This is Sales Department nonsense!)

You can no longer afford the luxury of pulling at will a special part out of the hat when you can so often do the same job better by taking a standard stock item out of a good manufacturer's standard book.

Everything about specials is special, even the foresight to want to lick them and the determination to do it.

Naval Supply Center

(*Continued from page* 206)

The Bureau of Supplies and Accounts in the Navy Department has now developed a standard 200- x 600-ft warehouse. This Center has grown over many years, and is burdened with many buildings that are inefficient from the standpoint of modern storage and handling methods. All new storage buildings being authorized in the Navy are now conforming to this superior standard—designed around our standard storage plant and to accommodate our standard materials handling equipment.

The Navy has made substantial strides in the even larger field of standardizing our stock items. We

have for you this morning a movie depicting the standardization program of the Ship's Parts Control Center at Mechanicsburg, Pennsylvania. Please remember that similar programs have been carried out for aviation, electronics, ordnance, and general stores materials. In brief, we have to identify and catalog items to see what we have. After this tedious process, we can then standardize by eliminating duplicated items, almost similar items, or nonessential items. From this comes the savings in bins, procurement, and stock control. In each of the technical supply systems, a constant hunt is on for the common hardware items to be found in most equipments in order that they may be carried in the general stores system, rather than as a unique technical item. I believe you will appreciate that the use of the term "cataloging" in the film is a synonym for the word standardization. I hope this movie will give you a sense of what standardization means to us at the Center. The Navy has made some progress, but is only a short way down the path. Perhaps in the year 1999, you supporters of standardization in industry will help the Naty reduce the need for storage areas in Norfolk to the point where we can substitute a Navy standard 200-x600-ft. single-story warehouse for this monster storehouse in which you now sit.

Fairbanks Morse Company, using cap screws with a diameter of 1 in and a length of 4 in, paid $50 to $70 per hundred. It paid $9 per hundred after the screws had become standardized under ASA procedure.

An Air Force Experience

(*Continued from page* 213)

or what, this Military Standard can perform a useful role only if it is kept up-to-date. When those who use this standard find data that can be improved by changes or additions, if they will so advise the Munitions Board Standards Agency, or any one of the individual services with whom they deal, they will be helping all of us who wish to keep the standard an up-to-date, useful reference manual. The Military Standard can be amended, revised, appendices added, or even entirely rewritten to make it more accurate and helpful and to keep us abreast of new developments.

Many engineers, technicians, scientists, and representatives of industry and the Armed Forces have contributed to the contents of MIL-STD-150. So many persons have helped that it is not possible to enumerate them in this article. The bibliography in Section 4 of the standard contains references to scientific articles authorized by many who took part in its development. To those whose names appear in this list, to members of the Munitions Board Standards Agency, and to the American Standards Association, our heartfelt thanks—and may other standards of equal importance and usefulness be forthcoming in the future.

Explains color measurement in practical terms of production and sale

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by DEANE B. JUDD, Chief of the Colorimetry Unit, National Bureau of Standards

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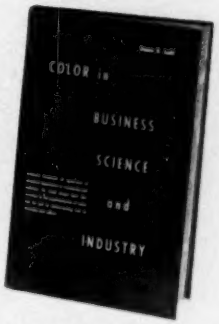

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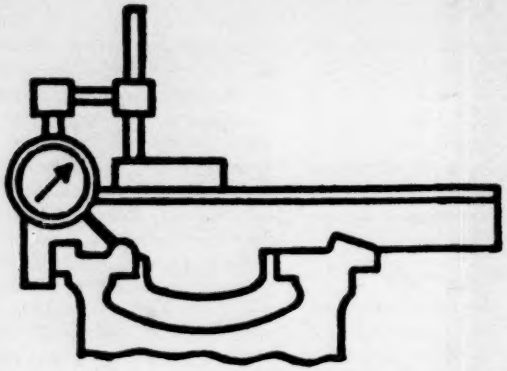

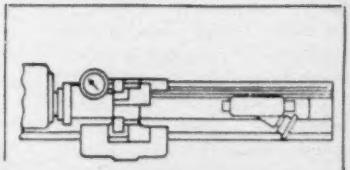

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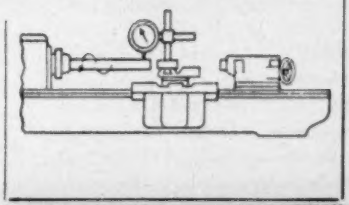

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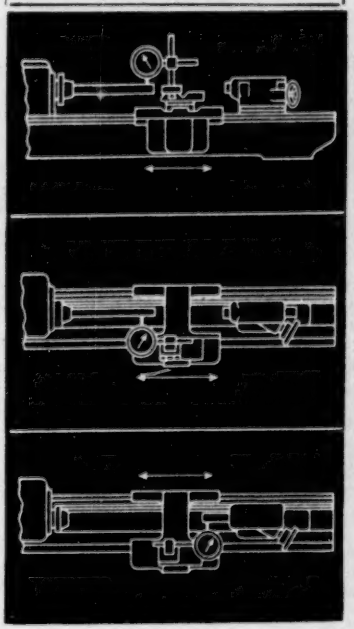

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